The Chemical Age

VOL LXVI 17 MAY 1952 No 1714

Safety First

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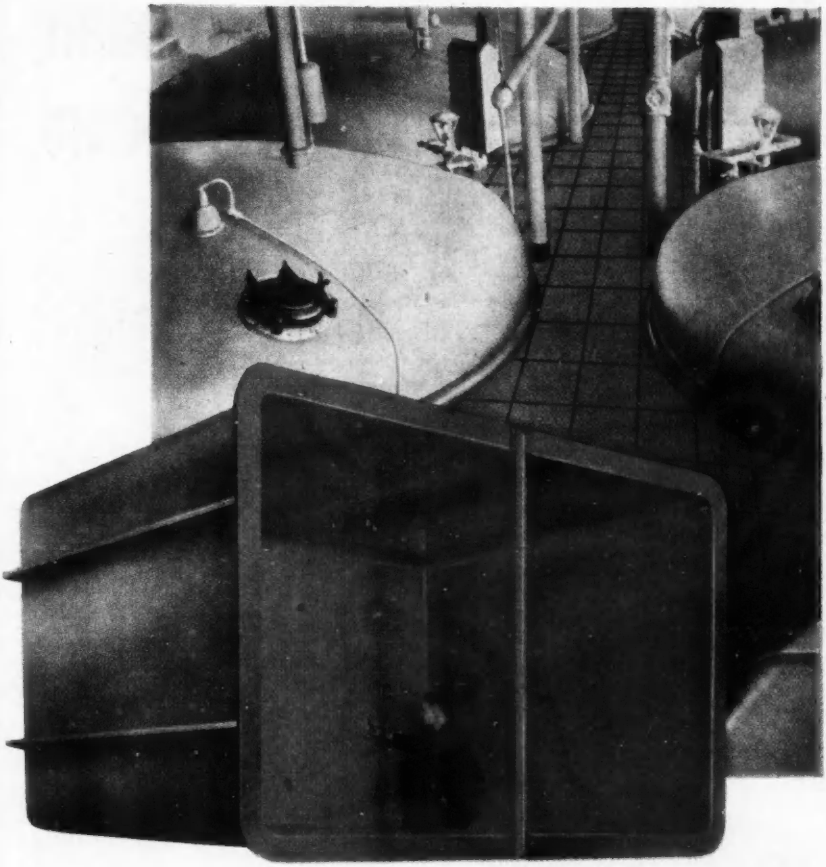

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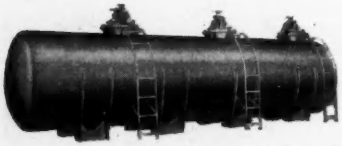

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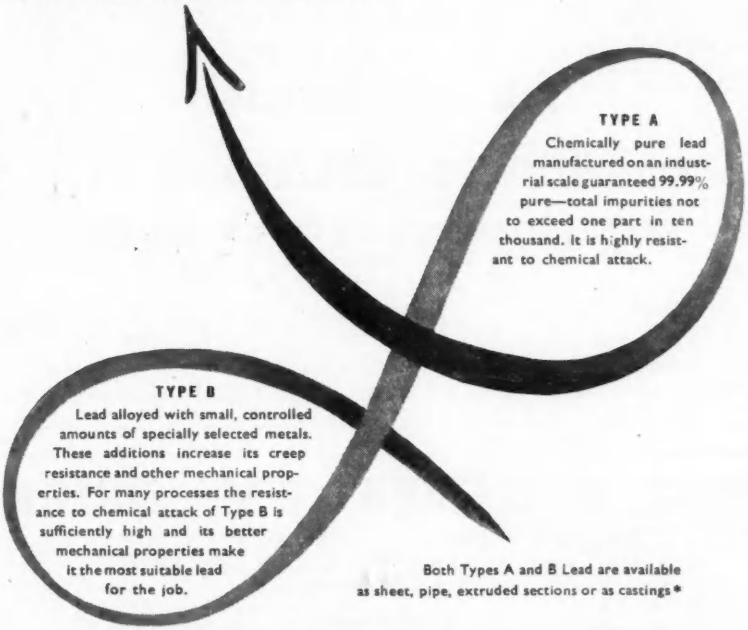

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Science & Economics

FOR many years the Department of Scientific and Industrial Research was concerned primarily with the physical sciences, though some of its investigations entered into the biological field. The economic significance of the research programme was never overlooked, for it has always been realised that the task of the Department is not the extension of knowledge *in vacuo*, but to ensure that the nation as a whole derives the greatest possible benefit from the information resulting from its work. In accordance with this basic principle the aim of the Advisory Council is to maintain a suitable balance between the immediate requirements of industry and the Services, and the scientific possibilities arising from long-term programmes of fundamental and applied research. The Department's stations have always been encouraged to undertake work on behalf of the executive departments, and their staffs have been free to carry out a certain amount of research or development which in their opinion might be profitable. The flexibility thus achieved has enabled maximum attention to be accorded to immediate problems within the broad framework of a co-ordinated programme of long-term research.

The Intelligence Division has the responsibility of interpreting to scientists economic needs of importance to their programme, and at the same time indicating to economic planners the scientific and technological possibilities which, in the long run, might have an influence on economic trends. A few years ago it was realised that, in view of its increasing size, the Department would have to devote greater attention to the economic factors involved in research. The staff therefore includes a few economists, and the basis of research has been broadened to take in surveys of factory practice and investigations aiming at the collection of comparative data on productivity.

The importance of a better understanding of the relationship between technology and economics is underlined by the problems currently presented by the world shortage of many raw materials. A high priority in the research programme is devoted to the conservation or replacement of scarce materials, but any technological solutions suggested by the work of the research stations or the research associations require to be examined in relation to economic considerations, which in the long run will determine the direction of progress. Close contact has therefore been established with the Ministry of Materials, which has been provided with technical surveys on the sulphur and sulphuric acid

position, the consumption of zinc and copper, and substitutes for non-ferrous metals.

In attempting to solve immediate problems it must always be borne in mind that a slight change in the economic position might increase a demand and so upset the entire outlook for a particular material. Similarly, a technological change such as the development of a new or improved process might have far-reaching consequences on future supplies and on industrial practice. The aim, therefore, is to obtain a comprehensive picture of the technological and economic position as a whole, in order that the potential effects of any measures proposed may be clearly understood. For example, the DSIR's recent summary of the sulphur position was largely concerned with technological aspects, but the effect of the price structure on world supplies was also stressed. Had the price of sulphur kept pace with the general increase in prices, British manufacturers of sulphuric acid would have had more incentive to convert existing contact acid plants to burn pyrites, and it is possible, therefore, that the shortages might have been less acute and that fewer dollars would have been required.

Unless all the consequences can be foreseen attempts to solve an immediate problem might only result in aggravating the difficulties which they were designed to solve. For example, it might be decided to overcome the difficulty of obtaining raw cotton from the United States by increasing the manufacture of viscose and encouraging the more extensive use of artificial silk. It would then become necessary, however, to find more hard currency for the purchase of soft wood pulp and the national consumption of sulphuric acid would also be increased. Again, the use of ground mineral phosphates in place of superphosphates is one of the most promising methods of conserving sulphur, but the advantages of this replacement must be balanced against any possible complications which might result from changing the calcium content of the soil.

In the United States a quantitative input-output method known as the Leontieff system is being worked out to determine the nature of the flow of materials through industry. This is not yet perfected, but may give a general indication of the balance of materials, though it will need adjustment for varying economic factors and technological changes. The need for greater knowledge of this complex subject is now widely realised, but it is only recently that attempts have been made to apply scientific methods to the investigation of all the many factors governing material supplies. The importance attached by the DSIR to this relatively new field for research is in itself an indication of the enormous benefits which could result from the maintenance of a general balance between supply and demand, based on the scientific study of both technological and economic trends.

On Other Pages

The annual subscription to THE CHEMICAL AGE is 35s. Single copies, 9d.; post paid, 1s.; SCOTTISH OFFICE: 116 Hope Street, Glasgow (Central 3954/5). MIDLANDS OFFICE: Daimler House, Paradise Street, Birmingham (Midland 0784-5). THE CHEMICAL AGE offices are closed on Saturdays in accordance with the adoption of the five-day week by Benn Brothers, Limited.

Notes & Comments

More News of Krilium

LARGE-SCALE production of Krilium, the new and synthetic soil conditioner, will not be delayed until 1953. The Monsanto Chemical Company are starting commercial manufacture in existing plant rather than waiting for new facilities. This may well indicate that the demand already created has been bigger than was expected. Alternatively, the creators of Krilium may be nervous that other and similar soil conditioning chemicals may take advantage of the immediate opportunity, for this is not a field in which only one polymeric chemical is likely to be successful. Already one relatively small U.S. chemical company is manufacturing 'Poly-Ack,' said to be another acrylate polymer with soil-conditioning properties. It is being sold at $18 per gallon, equivalent to about $2 per lb., with the recommendation that one gallon will treat 1,000 square feet of soil. Also, as Sir William Ogg reminded a British audience at a recent lecture to the Royal Society of Arts, alginates were shown some time back to have soil-conditioning possibilities in Rothamstead research. Nevertheless, it will be regrettable if competition, or undue fears of competition, hasten the development of chemical soil conditioning. In the long run new ideas develop more slowly when the commercial pace of their introduction is faster than the technical pace of development research. The so-called natural methods of maintaining soil condition are centuries old and many agriculturists are sceptical about short-cut chemical methods. Nothing will encourage this scepticism more than a public parade of the growing pains of polymeric imitators.

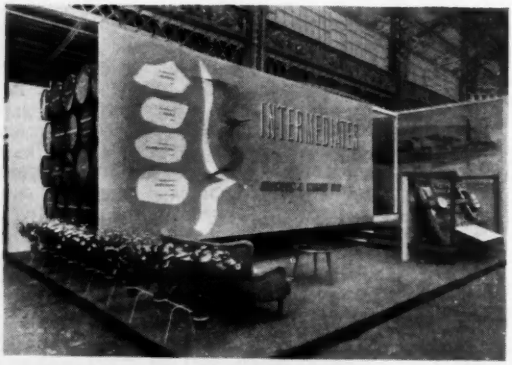
Plastic Carboys

IT is reported from America that polyethylene carboys were the star attraction at a recent packaging exhibition. Manufactured by the Plax Corporation (of Connecticut) the carboys are moulded in one piece and designed in two sizes—6½ and 13 gallons. Their two main assets are lightness and unbreakability. The main problem in their development was caused by polyethylene's ability to be punctured. To eliminate leakage risks from this cause strong plywood case-containers were designed. These are said to withstand approximately 10,000 lbs. of lateral pressure, are wax-coated inside, and also carry an acid-resistant coating outside. The neck of the polyethylene carboy, unprotected by the plywood container, is covered by a dome-shaped screw cap made of phenolic resin. This is, indeed, a second cap as it also covers the carboy's polyethylene screw cap.

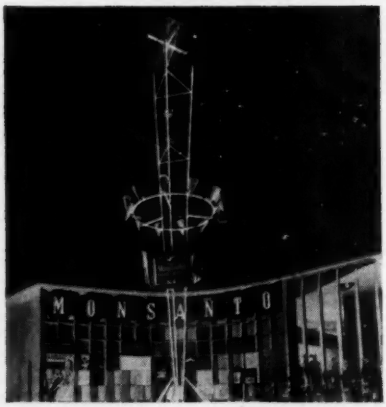
Claim Substantiated

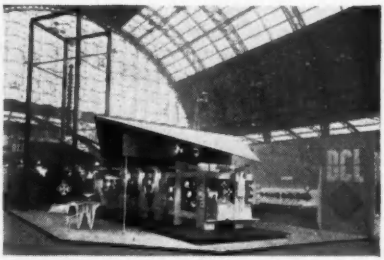
THE claim of lightness is substantiated by the following figures for a 13-gallon carboy. The polyethylene carboy plus its plywood case weighs 29 lbs. The usual glass carboy plus its wooden container weighs 70 lb. There is a small saving on transport charges when carboy-packed liquids are moved, possibly up to 20 per cent, and a much bigger saving when empty carboys are return-transported, as much as 60 per cent. As for unbreakability, 19 carboys were stacked in four vertical rows and then deliberately driven into by a heavy lorry; none were broken. Other advantages are claimed for the plastic carboys. Space is saved in truck or lorry loading as their shape is jar-like rather than spherical, enabling up to twice as many to be packed in the same space. There is little or no risk of carboy fracture through low temperature exposure and the freezing of the liquid contents; the polyethylene walls are flexible under all expectable temperature or pressure changes. Cost comparison, however, remains in favour of the traditional glass carboy. The plastic carboy is priced at about $25; the American comparison for glass is stated to be $12-$14. The extent to which polyethylene carboys enter chemical industry depends, therefore, upon their advantages being worth twice the initial outlay. It is anticipated that the largest initial use will be made for industrial acids.

Some Stands at the B.I.F. (Olympia)



A wide range of intermediates for the chemical and insecticide industries was featured by Hickson and Welch, Ltd.





A prominent tower of girders supporting a steel distillation column distinguished the stand of the Distillers Company, Ltd. (Industrial Group)

The comprehensive service to industry offered by Monsanto Chemicals, Ltd., was well illustrated in its display of products.
Right: The stand of J. W. Towers & Co., Ltd.

Chemical & Dyestuffs Traders

Chairman Reports on Year's Activities

THE 29th annual general meeting of The British Chemical & Dyestuffs Traders' Association was held in London on Tuesday, 6 May, with the chairman, Mr. Charles H. Wilson, presiding. After the accounts had been approved the chairman's report for the year ended 31 December was presented.

Mr. Wilson referred to the day-to-day work of the Association, and reminded members of the useful information contained in the bulletins. During the year, he said, a number of disputes arising out of contracts were settled by arbitration under the Rules of Arbitration of the Association.

The treatment of import licence applications for dyestuffs had often been the cause of dissatisfaction, and in October consultations were held between representatives of the Association and the Dyestuffs Control with a view to clarifying the position. It had been apparent for some time that the protection afforded to the home industry had the effect of establishing a monopoly of distribution, and the merchant specialising in dyestuffs suffered accordingly. While in some instances special circumstances might influence the present procedure for dealing with licence applications, the procedure called for revision at the earliest possible moment.

In the last annual report reference had been made to the subject of assessment to duty of landing charges of imported goods, and to the objection by the Association to H.M. Customs' proposal to extend to all ports the procedure of adding to the value a flat rate for landing charges. The real question at issue was the point at which H.M. Customs and Excise considered that the statute required the goods to be valued. A delegation, representing the Association and other bodies concerned, had held discussions with the Board of Customs and Excise and had stressed the advantages of a uniform point of valuation based on the c.i.f. value as represented by the commercial invoice. So far the discussions had not yielded a basis of agreement, but it was to be hoped that an equitable settlement of this long-standing problem would be reached.

Claims for pre-war German debts had been submitted on behalf of members to the Export Credits Guarantee Department with the object of securing a share of any sterling amount allocated for repayment of commercial debts.

It would be recalled, he continued, that during the year attention had been drawn to a case in which a wholesaler, not a member of the Association, had been prosecuted for sending by post a small quantity of a substance alleged to be dangerous. The container was quite unsuitable for carrying the substance and considerable damage had resulted.

In conversation before the dinner are left to right: C. E. Young, S. Bean, R. S. Walde, S. C. Harper, A. J. Lush and S. J. Treen

The knowledge and experience of members was a safeguard against mistakes of this kind, Mr. Wilson said, but the provision of containers for the carriage of chemicals had often been a real problem in recent years owing to the scarcity of steel drums.

Perhaps a more serious problem was the negligent handling of goods in the loading and unloading of ships. The loss of goods arising from breakages was very great and traders must be on their guard to see that injury resulting from negligent handling was not attributed to inadequate packing. The Association had recently received a report of a pending action which was of special interest to the trade.

Trade restrictions throughout the world had been on a scale not before envisaged in a time of peace, and merchants had felt the disruptive effect on trade of measures adopted by various governments to protect a declining economic position. It was not the object of these measures but the means of achieving them, often without notice, which was questioned. British merchant houses were resourceful and adaptable to changes in world conditions, but they were defenceless against the action of governments which cut across the sanctity of contracts. The revocation of licenses was an all too frequent occurrence and if governments did not recognise that contracts entered into by their nationals, in good faith, must be honoured, then confidence in international trade would reach a very low ebb.

The report concluded with an expression of appreciation of the services of the officers and Council of the Association.

The election of officers as follows was announced: Mr. G. S. Bache, president; Mr. C. W. Lovegrove, vice-president; Mr. C. H. Wilson, chairman; Mr. C. Norton Stafford, C.B.E., T.D., vice-chairman; Mr. Ian D. Orr, A.M.I.M.M., hon. treasurer; and Mr. R. Heap, F.R.C.A., hon. auditor. Messrs. C. F. Blagden (Victor Blagden & Co., Ltd.), Mr. T. Gregson (Millwards Merchandise, Ltd.), and Mr. S. R. Price, M.B.E., M.A. (Price Stutfield & Co., Ltd.) were elected to the Executive Council.

At the annual luncheon which was held at the Savoy Hotel following the meeting, the R. Hon. Viscount Swinton, Chancellor of the Duchy of Lancaster, proposed the toast 'The Association'. After pointing out that he had taken some interest in the establishment of the Association when he was President of the Board of Trade in 1923 in so far as he had encouraged the amalgamation of the various bodies concerned, Lord Swinton said that he had always felt that this country, with world-wide trade, needed all the best that both the manufacturing industry and merchanting could give. This country lived by exports—invisible as well as visible. Members, so far as they could muscle in, were on the selling end of the chemical industry and this industry was a great asset to the U.K. It had contributed remarkably to individual and national health. It employed something like 150,000 and had an annual turnover of approximately £500,000,000. Exports in 1951 had been nearly £150,000,000.

One of the great things was the partnership between the chemical industry and

Left to right: Sir Edward Redmayne-Jones, chairman of the British Federation of Commodity Associations, Mr. G. S. Bache, president, and Viscount Swinton

Left to right: Mr. Ian D. Orr, hon. treasurer, Mr. Edwin McCarthy, Acting High Commissioner for Australia and Mr. C. F. Blagden

agriculture. Being a Yorkshireman, he was a farmer and he thought that this was the right kind of partnership.

The co-operation of the manufacturer and the merchant had never been more important. We could not live by cuts alone; we could not live by cuts at all. This country must export and she must do more than just bridge the gap. The position was now infinitely better than it had been, for confidence bred business. We had come very near to disaster and it had been found necessary to restrict imports. It was equally necessary, however, to increase exports. Reserves must be built up and the new strength of the pound enabled the U.K. to make use of her vast trading experience which was based upon world-wide knowledge of markets as well as upon her integrity. Her 'know-how' consisted not only of knowing what the markets wanted, but also of being able to anticipate what they would want in the future.

He knew how useful members had been during the war and he would ask them to carry on in this way, co-operating with both the manufacturer and the Government.

The president, Mr. G. S. Bache, replied, saying that there had been a glorious period during the reign of Queen Elizabeth I when the merchant adventurers had gone forth. From their activities the British Commonwealth had arisen. He felt sure that if a greater release from frustrations and controls was permitted the task of the Chancellor of the Exchequer would be made much easier.

Mr. Wilson proposed the toast to the 'Guests' and Mr. Edwin McCarthy, acting High Commissioner for Australia, replied.

Solvents Prices Reduced

REDUCTIONS in price of M.I.B.K. and S.B.A. by £10 per ton and £25 per ton respectively, effective from 8 May, are announced by Shell Chemicals, Ltd. These reductions bring the price of Shell M.I.B.K. for the 10-ton rate to £187 per ton and of Shell S.B.A. for the 10-ton rate to £142.

A. Boake, Roberts & Co., Ltd., have reduced their prices for butyl alcohol and butyl acetate by £25 and £15 per ton, respectively, effective 12 May.

British Industrial Solvents, Ltd., have also announced that with effect from 12 May 'BISOL' butyl alcohol and butyl acetate were reduced by £25 and £15 respectively. New prices for one-ton lots, carriage paid, in packages returnable at seller's expense are: butyl alcohol £181 a ton; butyl acetate £209 a ton.

Home Production Planned

The Quebec Provincial Government is on the eve of signing an agreement with a group of manufacturers in the Province to produce fertilisers for Quebec farms. Until now, fertilising products had been imported to Quebec from other provinces and the Premier said recently that 'Quebec farmers are at the mercy of outside producers'.

Krilium Sales Commence

THE originators and manufacturers of Krilium soil conditioner, Monsanto Chemical Company, announced on 7 May, that sale of Krilium in the United States on a nation-wide basis commenced on 12 May. The price, originally forecast as approximately $2 dollars a lb., will now be $6.95 per 5 lb.

Development of the new conditioner was announced at the American Association for the Advancement of Science meeting in Philadelphia, 29 December, 1951, when Dr. Charles Allen Thomas, president of Monsanto, said that Krilium would not be available to the public until early 1953 because of an intensive development programme being carried on by the company.

While extensive tests are still in progress to provide additional technical information, results from recently completed studies, plus availability of additional manufacturing equipment have now permitted Monsanto to make available an improved form of Krilium sooner than was originally expected.

Dr. Thomas emphasised that because of the originality of research and far-reaching results of tests made over a period of years Monsanto has filed a number of patent applications throughout the world covering Krilium soil conditioner, and has taken legal steps to protect its position as originator and developer of the product.

Monsanto Chemicals, Ltd., British subsidiary of Monsanto Chemical Company, has recently commenced large-scale testing of Krilium under British conditions, and the company have announced that close consideration is being given to the early manufacture and marketing of it in the U.K.

Sulphuric Acid Returns

First Quarter Stocks Improve

STOCKS of chamber and contact sulphuric acid and oleum at 31 March, 1952, totalled 79,486 tons.

Consumption in Britain during the first quarter of 1952 amounted to 438,819 tons, including 19,585 tons of imported acid.

These figures and the following tables are from the Summary of Monthly Returns for the United Kingdom issued by the National Sulphuric Acid Association, Ltd.

PRODUCTION OF SULPHURIC ACID AND OLEUM
(*Tons of* 100 *per cent* H_2SO_4)

	Chamber only	Contact only	Chamber and Contact
Stock 1st Jan., 1952 ..	33,644	42,128	75,772
Production	160,664	257,143	417,807
Receipts	21,032	22,980	44,012*
Oleum feed	—	2,060	2,060
Adjustments	—31	—17	—48
Use	92,423	129,383	221,806
Despatches	91,130	147,181	238,311
Stock 31st March, 1952	31,756	47,730	79,486
Total capacity represented	197,760	315,750	513,510
Percentage production ..	81.2%	81.4%	81.4%

* Includes 8,084 tons of imported acid.

RAW MATERIALS
(*Tons*)

	Pyrites	Spent Oxide	Sulphur & H_2S	Zinc Concentrates	Anhydrite
Stock 1st Jan. 1952 ..	111,255	247,679	74,931	53,161	370
Receipts ..	77,546	71,038	81,119	44,451	47,922
Adjustments	+25	—9,429	—181	—135	—
Use ..	56,164	60,220	69,768	37,622	47,422
Despatches ..	23	4,258	65	19	—
	233*	349*			
Stock 31st Mar. 1952 ..	132,406	244,461	86,036	59,836	870

* Used at works for purposes other than sulphuric acid manufacture.

The above figures include production at Government plants where those plants are producing acid for trade purposes.

CONSUMPTION—UNITED KINGDOM
(1 *January*—31 *March*, 1952)

Trade Uses	Tons 100% H_2SO_4
Accumulators	2,261
Agricultural purposes	584
Bichromate and chromic acid	3,777
Bromine	3,520
Clays (Fuller's earth, etc.)	1,878
Copper pickling	495
Dealers	2,740
Drugs and fine chemicals	3,438
Dyestuffs and intermediates	19,529
Explosives	5,390
Export	354
Glue, gelatine and size	125
Hydrochloric acid	15,510
Hydrofluoric acid	3,074
Iron pickling (incl. tin plate)	24,559
Leather	945
Lithopone	4,948
Metal extraction	439
Oil refining and petroleum products	18,260
Oils (vegetable)	2,320
Paper, etc.	869
Phosphates (industrial)	334
Plastics, not otherwise classified	6,862
Rayon and transparent paper	57,403
Sewage	2,289
Soap and glycerine	2,432
Sugar refining	126
Sulphate of ammonia	72,443
Sulphates of copper, nickel, etc.	6,497
Sulphate of magnesium	946
Superphosphates	94,529
Tar and benzole	4,350
Textile uses	4,608
Titanium oxide	29,926
Unclassified	41,059
Total	438,819*

* Includes 19,585 tons of imported acid.

The above figures show the two items 'Lithopone' and 'Titanium Oxide' which have previously been included under 'Paint and Lithopone.' The small quantity of acid used for paint is now included in 'Unclassified.'

MIDLANDS SOCIETY FOR ANALYTICAL CHEMISTRY

Developments in Analytical Chemistry

AT a meeting of the Midlands Society for Analytical Chemistry held recently in Birmingham, Mr. R. Belcher, B.Sc., F.R.I.C., F.Inst.F., read a paper on 'Some Recent Developments in Analytical Chemistry'. Mr. Belcher's paper was in three sections—new titrimetric reagents, organic reagents and selected metals. In last week's issue we published the first section and part of the second. Following is the remainder of the lecture:—

N-Benzoylphenylhydroxylamine has been used by Shome (1950) for the gravimetric determination of aluminium, copper, iron and titanium. The compound is closely related to cupferron, the ammonium salt of N-nitrosophenyl hydroxylamine, and it possesses several advantages over this reagent. Thus, it is stable indefinitely, and the complexes it forms with aluminium, iron and copper may be weighed directly, although the titanium complex must be ignited to the oxide and weighed as such.

Phosphate, arsenate and arsenite do not interfere in the determination of copper if a small amount of Rochelle salt is added to the solution. Molybdate, tungstate and vanadate ions interfere, as they give precipitates with the reagent.

Aluminium and iron, however, cannot be separated from solutions containing phosphate. Beryllium, cadmium, cobalt, lead, manganese, mercury[a], nickel, uranium[a] and zinc do not give precipitates with the reagent at *p*H 4, but tin, titanium and zirconium are precipitated, and chromium[a] interferes with the precipitation of iron. It is not possible to determine Al, Cu and Fe in the presence of each other.

Precipitation Conditions

Precipitation of aluminium, copper and iron is best effected at *p*H 4. The reagent is an ethanolic solution of the N-benzoyl phenylhydroxylamine and is added to the boiling unknown solution. After digestion at 65°C. on the water bath, the precipitate is washed thoroughly with hot water and dried at 110°C. to constant weight. Excellent conversion factors are obtained, these being: Al = 0.04064, Cu = 0.1303, Fe = 0.08064.

For the determination of titanium, precipitation must be effected below 25°C., otherwise a gummy mass results. Precipitation is effected at somewhat higher acid concentrations than are used for the aluminium, copper and iron determinations. 5-20 ml. of concentrated hydrochloric acid may be present in a volume of 400 mls. Low results are obtained under more strongly acid conditions.

Metal Precipitant Tried

Merritt and Walker (1944) have examined the compound 8-hydroxyquinaldine (2-methyl-8-hydroxyquinoline) as a metal precipitant. They found that, as with oxine, it precipitates several metals, but is more selective than the parent compound. The main advantage of the reagent is that it will not form an insoluble complex with aluminium, although it readily forms such complexes with zinc. Thus, the reagent has been used for the determination of zinc in the presence of aluminium. Merritt and Walker suggest that the non-precipitation of aluminium is due to the increase in bulk of the molecule, making it impossible for three such molecules to group round one aluminium atom. This may be so, although it is not known why such a small group as the methyl group should have such an effect. Perhaps the methyl group acts anomalously in this case, as it so often does in organic compounds. The substitution of higher aliphatic grouping in the 2-position should provide the true solution to this problem.

When aluminium is present in the zinc solution, ammonium tartrate is added to the slightly acid solution. After neutralisation, the reagent, a 5 per cent solution of 8-hydroxyquinaldine in 12 per cent v/v acetic acid, is added and then 2-3 drops of 0.88 aqueous ammonia solution. After dilution, the solution is heated to 60-80°C., neutralised with 3N aqueous ammonia and 2N ammonium acetate solution added. After standing, the precipitate is filtered through a porous Gooch crucible, washed with hot water, dried at 130-140° and weighed. The precipitate may be dissolved on the filter and determined bromometrically.

Magnesium can be determined in presence

of zinc, after first removing the zinc as above and suitably adjusting the acidity of the filtrate.

The classical *o*-diacetyldioxime (dimethylglyoxime) reagent for nickel suffers from the disadvantage that it is insoluble in water, and if conditions are not strictly controlled, it may precipitate with the nickel complex. Washing tends to dissolve the precipitate and low results are thus obtained. In 1924 Wallach prepared the water-soluble *o*-cyclohexanedionedioxime (nioxime) and found that it was even more sensitive to nickel than the original dimethylglyoxime. The use of this water-soluble dioxime for the determination of nickel minimises the danger of contaminating the nickel precipitate with excess reagent and avoids the solvent action of alcohol on the precipitate.

Properties Studied

Rauh, Smith, Banks and Diehl (1945) have made a detailed study of the properties of this dioxime, and Voter, Banks and Diehl (1948) showed that it can be used satisfactorily for the gravimetric determination of nickel in the presence of many of the common anions and cations. However, although nioxime possesses several advantages over dimethylglyoxime, including quantitative precipitation of nickel down to *p*H 3, an empirical factor has to be applied to correct for the small amount of excess reagent carried down. Again, its use as a reagent for nickel is limited as it will not determine nickel in presence of iron by means of a single precipitation, and in addition the precipitate is difficult to filter.

Voter and Banks (1949) examined the compound, 1,2-cycloheptanedionedioxime (heptoxime) as a nickel precipitant, and found it eminently satisfactory for this purpose. It precipitates nickel quantitatively from solutions of *p*H 2.7 or greater and the precipitate is easily filtered and does not tend to creep. In the presence of ammonium acetate, adsorption of excess reagent by the precipitate is minimised. Nickel can be determined in the presence of many metals including iron, precipitation being effected at a *p*H of about 4.

Determination of Selected Metals

Several new gravimetric procedures have been developed for the determination of zirconium. This element is generally precipitated as zirconyl phosphate [$(ZrO.CH_3PO_4)_3$] with ammonium phosphate, and the precipitate then ignited to the pyrophosphate (ZrP_2O_7), and weighed as such. Only amounts of zirconium greater than 20 mg. can be determined satisfactorily in this way. The precipitate is bulky and gelatinous and is thus difficult to wash and filter.

Willard and Hahn (1949) have examined the possibility of precipitating the zirconium phosphate by slow hydrolysis of certain organic phosphates. Trimethyl phosphate has been found to be the most suitable. The resulting precipitate is dense and quite crystalline: accordingly, it is easily filtered and washed. A disadvantage is that 12-15 hours are required for complete precipitation, which is effected from either hydrochloric or sulphuric acids at a concentration of 3.6N. The precipitate is ignited to the pyrophosphate as before. The range of zirconium determined in this way is 2-60 mg.; with amounts greater than 60 mg., low results are obtained. Venkataramaniah and Rao (1951) have shown that the compound *m*-cresoxyacetic acid will separate zirconium from many other metals including aluminium, barium, beryllium, calcium, nickel, the rare earths and uranium. Precipitation of the zirconium is quantitative, and the precipitate which forms in solutions 0.2-0.25N with respect to hydrochloric acid are easy to handle. The precipitate is ignited to the oxide. Certain elements, e.g., titanium, tin and chromium, which themselves are not precipitated by the reagent tend to co-precipitate with the zirconium.

Single Precipitation

Purushottam and Rao (1950) separate zirconium from aluminium, beryllium, iron, manganese, nickel, thorium, uranium and the rare earths by a single precipitation from acid solution with phthalic acid. In the presence of chromium, tin, titanium and vanadium, a second precipitation is necessary.

Certain separations may be carried out in neutral solution. Thus, a double precipitation of zirconium from neutral solution will give a separation from chromium and vanadium. The acidity for normal separations is 0.3N. Addition of ammonium nitrate is necessary before precipitation is effected, otherwise the precipitate is gelatinous in nature and difficult to filter. The reagent is a 4 per cent aqueous solution of phthalic acid and is added boiling to the boiling zirconium solution with continuous stirring.

The mixture is digested at the temperature of a boiling water bath for 2 hours, and allowed to cool for a further hour. After filtering and washing successively with dilute phthalic acid solution in 0.3N hydrochloric acid and 2 per cent ammonium nitrate, the precipitate is ignited and weighed as ZrO_2.

Kumins (1947) precipitates zirconium quantitatively from hydrochloric acid solution using mandelic acid as reagent. Several metals which usually interfere when zirconium is precipitated with other organic reagents do not interfere, e.g., aluminium, chromium, titanium, vanadium, etc. Sulphuric acid may be used in place of hydrochloric acid, but low results are obtained when the free sulphuric acid present exceeds 5 per cent. Low results are also obtained if this free acid is neutralised with ammonia, though not if sodium hydroxide is used.

Hahn (1949) has extended the determinable range of zirconium to 0.1-300 mg. and shows that the concentration of hydrochloric acid is not critical. He also shows that certain metals, e.g., cobalt, nickel and zinc, which have not been examined by Kumins, do not interfere. Certain derivatives of mandelic acid also possess zirconium-precipitating properties.

Oesper and Klinginberg (1949) have examined a number of these derivatives and find that *p*-bromo and *p*-chloro-mandelic acids are most suitable. These two compounds possess a greater sensitivity towards zirconium than does mandelic acid. The precipitates can be washed with water and do not require a special wash liquid. The precipitates can be weighed without ignition to the oxide, although some trouble is experienced on other than pure zirconium solutions. The ignition method is, therefore, preferred.

Bromo Acid Preferred

Free sulphuric acid can again not be tolerated in amounts greater than 5 per cent, and this must be neutralised as before with sodium hydroxide. The authors prefer the bromo compound, although both reagents are preferred to the unsubstituted acid.

Methods available for the determination of germanium generally suffer from lack of selectivity. Arsenic, with which germanium is often associated, is the most commonly encountered interference. The tannin-precipitation procedure will separate germanium from all other metals with the exception of columbium, tantalum and tungsten, but when small amounts of germanium are involved, the precipitate tends to become colloidal. A preliminary ignition is necessary in this latter instance followed by repeated oxidation with nitric acid, before the final ignition at 900°C.

Germanium will react with mannitol in aqueous solution to form a strong complex acid which can be titrated either alkalimetrically or iodometrically. Cluley (1951) has developed a titrimetric method for the determination of germanium, based on the earlier procedure of Tchakirian who stated that the method was not applicable in the presence of strong acids. Cluley has examined three titrimetric procedures which have been used for the determination of boron, using germanium solutions containing free sulphuric acid. The method is preferred wherein the solution is adjusted to a bromocresol purple end-point with alkali. Mannitol is added and the solution titrated to the *p*H obtaining before the addition of mannitol (6.2). This procedure appears to be less susceptible to errors caused by other ions.

Separated as Sulphide

The germanium is separated as sulphide from other ions, such as boron and many of the bases likely to be precipitated with alkali during the course of the titration.

Amounts of arsenic[3] of the order 100 mg. do not interfere in the determination of 10 mg. or less of germanium, but arsenic[4] interferes because of the buffering effect. Reduction with sulphur dioxide eliminates this interference. Only traces of antimony or tin can be tolerated.

The complex which 5,6-benzoquinoline forms with the unstable trioxalatogermanic acid provided Willard and Zuehlbe (1944) with a gravimetric method for the determination of germanium. The reagent is a 2 per cent solution of 5,6-benzoquinoline in 1 per cent aqueous oxalic acid solution. It is added to a hot solution of trioxalatogermanic acid (prepared by adding oxalic acid to a solution of germanium) and the mixture allowed to cool to room temperature. The complex precipitates as long needles which are allowed to stand overnight, filtered, washed with a dilute solution of the reagent, and ignited to white germanium oxide at 700-800°C.

The precipitated complex is easy to filter

but some reagent is co-precipitated, hence it is essential to ignite to the oxide. Tin, titanium and zirconium interfere by forming insoluble complex oxalates. High concentrations of sodium chloride prevent complete precipitation of the complex and on occasion inhibit precipitation altogether.

When germanium solutions buffered with potassium acetate are treated with hydrogen sulphide or potassium sulphide, insoluble potassium thiogermanate is formed. On treatment with iodine, the precipitate liberates sulphur and the excess iodine may be determined by titration with standard thiosulphate. Willard and Zuehlbe (1943, 1944) have devised this titrimetric procedure and obtain satisfactory results. They find that high concentrations of sulphide ion are necessary to give a quantitative precipitation of germanium. Metals which give insoluble sulphides in acid solution interfere.

The precipitating reagent used is an 8 per cent solution of potassium hydroxide saturated with hydrogen sulphide. The precipitated potassium thiogermanate is not removed from the mixture, but is treated with iodine, after removal of excess hydrogen sulphide and dilution, and allowed to stand. The iodine in excess is then determined.

Eighteen Methods Studied

Difficulty is often experienced in the determination of calcium in the presence of magnesium. Peltier and Duval (1947) have critically examined some 18 precipitation methods for the determination of calcium, with a view to finding a method with which at least a twenty fold excess of magnesium will not interfere. The methods they have examined are:—

Precipitation as oxalate in the presence of (1) acetic acid, (2) glycerol, (3) formic acid; as oxalate, but instead of ammonia, using (4) aniline, (5) antipyrene, (6) hexamine, (7) pyridine, (8) urea, (9) tungstate, (10) molybdate; (11) as sulphate in the presence of ethanol followed by reprecipitation as oxalate, (12) as oxalate after precipitation of magnesium with oxine, (13) as oxalate by the classical procedure, (14) as the potassium calcium nickelinitrite complex, (15) as tartrate, (16) as iodate, (17) as sulphite and (18) as picrolonate.

They conclude that the tungstate method is the best as it is the most rapid and accurate.

German Microfilms

NEW microfilms available from the Technical Information and Documents Unit of the DSIR include reports on analytical chemistry emanating from I.G. Farbenindustrie, of Hoechst on Main, and on manufacturing data—in English—on dyes and textile auxiliaries from the same source. The list of analytical reports was compiled by Allied investigators.

The data on textiles give the chemical name and composition of 364 individual items, as well as their principal uses, production processes, tests to be carried out, by-products produced and apparatus, raw materials, intermediates, heat and power required. Copies of the microfilms are available from the unit at Cunard House, 15 Regent Street, London, S.W.1.

Chemicals at Hanover Fair

PROOF of the German chemical industries revival and development since the war was shown recently in the success of the 1952 Technical Fair, Hanover. Some 150,000 people visited the 53 exhibitors in the Hall of Chemistry and the numerous other chemical manufacturers represented in the halls of other branches of industry.

Discussions held during the fair on technical processing, new products, prospects for delivery and export, it was felt by the exhibitors augured well for future prospects.

The plastics section of the chemical industry probably showed the greatest improvement and advance orders booked will ensure production for some time ahead.

U.S. Mercury Adequate

THE supply of mercury in the United States is now believed to be adequate to take care of all foreseeable civilian and military needs, according to reports. In view of the easy supply situation 'the need for future Government assistance to expand production is not anticipated.' While the United States is still largely dependent on imports of mercury, mainly from Spain and Italy, U.S. production of mercury has shown some increase during the past two years, present production being about 60,000 flasks, each of 76 lb., a year. The present price is more than $200 (about £70) per flask.

The Oil Industry in Alberta

The Neil Matheson McWharrie Lecture was delivered to the Commonwealth Section of The Royal Society of Arts on 24 April, by Mr. S. M. Blair, vice-president of Canadian Bechtel, Ltd., and vice-president of Trans Mountain Oil Pipe Line Company.

The following is the remainder of the report which commenced in THE CHEMICAL AGE, *Vol.* **66**, *Pp.* 715-718.

THE bulk of the nation's requirements of refined oils is provided by plants in Canada. The existence of the refineries which handle about 90 per cent of the total supply is partly due to the tariff regulations which impose an import duty on refined products, while crude oil is permitted to enter the country duty free. As a result of the extensive construction programmes which have taken place during recent years, many of the thirty-nine refineries now operating are of modern design.

CANADIAN REFINERIES
(*End of* 1951)

	West of Great Lakes	*All of Canada*
Number	28	39
Total capacity	148,000 B/CD	391,000 B/CD
Cracking Thermal ..	43,000 ,,	135,000 ,,
,, Catalytic ..	13,000 ,,	66,000 ,,
Lubricating oil production	—	5,500 ,,

The great distances across Canada can readily lead to shipping cost becoming excessive. The arrangements that have been made to reduce oil transportation expenses to a minimum have had a fundamental effect on both the location of refineries and on the country's marketing arrangements. The overall policy followed is first to satisfy the prairie markets from western refineries. The excess crude production will be directed east and west. The westward flow will be through the new Trans Mountain Oil Pipe Line to the refineries at Vancouver where products will be made for the British Columbia market. The eastward flow will be through the Interprovincial Pipe Line to the Great Lakes, where it will be transferred to large tankers and shipped to the Sarnia district on the eastern shore of Lake Huron.

Eastern Canada is supplied almost entirely by foreign oils, which are received either by the Portland-Montreal Pipeline or by tanker. A part of the output from the Montreal refineries will be sent as far west as Toronto through the new Trans Northern produce pipe line, and there the products of crudes from Western Canada and, say, South America, will meet.

Thus Canada in the near future will have a Trans-continental pipeline system for crude and products totalling some 2,700 miles, which, with the tanker movement on the Great Lakes, provides a one-way transport system that spans the nation.

The Trans Mountain Oil Pipe Line development has undertaken to provide the westerly movement of Alberta's oil. Since no crude oil pipeline in North America has previously taken oil from the Prairies to the Pacific Coast, it is of interest to note the plans for the first line. The line will be 24-in. in diameter and about 700 miles in length. It will have an initial capacity with two pumping stations of approximately 75,000 barrels per day, and is so designed that later, with the addition of four more pumping stations, it will have a capacity of 200,000 barrels per day.

Development Materials Used

The development will use about 175,000 tons of steel and cost about $80,000,000 when completed in 1953. It is owned by the public and a large group of oil companies in which many of the majors are included. No shareholder has more than one-twelfth of the equity. This development is a pipeline engineering project comparable with any on the North American continent, and is another link in the chain of oil operations that are steadily bringing the Canadian oils into wider markets at competitive prices.

The total number of persons engaged in the petroleum industry is always small in respect to both the capital investment and the value of the products made. At present about 25,000 persons are directly employed in the Canadian industry. Due to rapid expansion there are still not enough experienced personnel for either the top oil field executive positions or for all of the specialised technical field work. This position is changing as more become adequately trained and the smaller companies are now almost completely staffed in all branches with British nationals. The greatest shortage of trained manpower is probably in engineering work, and particularly as applied

to production, construction and refining.

The oil refining processes and technique used in the Canadian refineries have developed largely in the United States. Process engineering and design, however, can be carried out completely in the country by some of the major organisations.

Import Needs

Essential supplies for the industry are now largely manufactured in Canadian plants. In some cases a number of the components are imported for assembly in the country, while in others the work is done under licence from abroad. With regard to the availability of supplies manufactured in Canada, it is now simpler to state the items which are *not* made than to attempt to list the home production. The principal refinery equipment that has to be imported is:—

Pipe over 16 in. in diameter;
Heavy wall furnace tubing;
Alloy heat exchanger tubing;
Turbines;
Desalting equipment other than spheres;
Compressors over 1,000 h.p.;
Explosion-proof motors over 150 h.p.

The oil field drilling equipment at present is almost all imported. The duty is limited on that class of supplies and the manufacture in Canada is still extremely small. Products from the United Kingdom enter Canada at favourable tariff rates, under the British Preferential Tariff Classification.

Total capital investment over the past five years has been estimated to be £1,000,000,000, of which only one or two per cent has come from sources outside the North American continent. The largest portion comes from the United States, though it is often difficult to establish the ownership of all the capital due to interlocking controls. The nation's own contributions can be divided into, firstly, all Canadian money originating and entirely controlled in the country; and, secondly, the investment of some of our biggest companies who have largely local shareholdings but are subsidiaries of American organisations. It is estimated that each of these two groups account for about 20 per cent, so that Canada's dollar contribution to the capital expenditure in the last five years is less than 50 per cent of the total.

The annual revenue estimated from the Canadian oil industry for 1951 is $120,000,000.

When the Leduc field was brought in, about 90 per cent of Canada's oil requirements were imported. Now, five years, later, the country could produce more than 200,000 barrels a day, or about 50 per cent of the requirements, which is supported by reserves of 15,000,000,000 barrels. Since 1947 the reserves have been increasing at a rate of about 300,000,000 barrels per year.

The annual expenditure necessary to support such a development scheme is now passing $225,000,000. For this amount some 500 exploratory wells, costing from $50 to $500,000 each, were drilled, of which about 350 were dry holes. The oil executive continually draws attention to the reward that is awaiting the man who develops a use for that most useless commodity—dry wells.

New Adhesion Agent

THE Road Research Laboratory is now recommending a new adhesion agent D.S. 2274 for use in surface dressing in wet weather. It replaces cetyl pyridinium bromide which was previously recommended but is now unobtainable. The new material is at present in adequate supply and has been shown by laboratory tests to be quite as good as the original agent recommended.

The new agent D.S. 2274 is used to prevent the serious failures which may be caused by rain falling on newly laid surface dressings. Its use means that surface dressing work need no longer be limited to periods of fine settled weather.

It is applied in a solution of creosote to the interface between the binder and the stone chippings which are scattered on the binder (tar or bitumen) immediately after it has been spread on the surface of the road. The application is made either by coating the chippings with the creosote solution in a bituminous or concrete mixer or by sprinkling the solution on the freshly laid binder film before the chippings are spread. In the sprinkling method the solution is applied from an attachment towed by the binder distributor.

Road tar suppliers have full information on the making up and application of D.S. 2274 and will supply it at the correct concentration for use.

A Year of Pest Infestation Research

Wide Scope of Investigations at Slough

DESPITE the limitations of staff and the regretted inability to begin work on the urgently needed new laboratories, steady progress was made in all branches of the work carried out by the Pest Infestation Research Laboratory, at Slough, Bucks, during 1950.

In the survey of its activities for that year now published for the DSIR* the Pest Infestation Research Board states that it considers that a reasonable balance has now been struck in the programme of research between the practical work necessary for the solution of day-to-day problems and longer range basic research. The hope is expressed, however, that an increase in the number of research staff will soon be possible.

Work in the field undertaken by the Biology Section was considerably increased during the period under review. Although it was too soon to report definite results this step was welcomed as ensuring that the biological work was being maintained on a proper basis of field ecology.

Observation Made Possible

Through the co-operation of the Infestation Control Division of the Ministry of Agriculture and Fisheries, a large 'mixed' warehouse had been made available to the laboratory for observational work on insect populations under normal storage conditions. Apart from any practical results that might emerge from surveys carried on in this warehouse over an extended period, the opportunity for junior staff to study insects in their natural surroundings added a stimulating incentive to their laboratory investigations.

Factors influencing the accuracy of the carbon dioxide method for estimating the animal life in samples of grain had been re-examined.

Samples were normally incubated at 25° C. The amount of carbon dioxide produced depended on temperature; if the grain was incubated at 17°C. the carbon dioxide produced was 45 per cent less than at 25°C.; at 28°C. it was 30 per cent more, and at 33°C. it was 75 per cent more. Insects which had been in cool conditions gradually acclimatised themselves to the higher incubation temperature. A period of one day for conditioning to the incubation temperature was therefore required.

Accumulation of carbon dioxide reduced the activity of insects; this effect became detectable when the concentration of carbon dioxide was about 4 per cent, and was marked at concentrations of 10 per cent or more.

Control of Humidity

Information about techniques and recent data relating to the control of humidity in laboratory work had been set out in a paper which was in the Press.

Improvements had been made in the method of measuring humidity colorimetrically with papers impregnated with cobalt thiocyanate. In collaboration with the Tintometer Company a method had been devised whereby the test papers, immersed in oil, might be matched against coloured glass standards.

From time to time mycological investigations had been carried out on various foodstuffs in storage. These included a series of experiments showing that the growth of fungi and bacteria in a dump of maize resulted in heating (with recorded temperatures as high as 62°C.) and eventual blackening of the grains. The success of heat treatment for the control of an extensive mould growth on stored prunes was also checked by a number of inoculation experiments.

A considerable number of investigations on immediate practical problems have been carried out by the Insecticide Section. The following examples were typical:—

1. Work had shown that the effectiveness of a combined pyrethrum + benzene hexachloride spray varied with different species of insect. It was particularly toxic to the Flour Beetle, *Tribolium castaneum.*

2. The pronounced synergistic action of piperonyl butoxide on pyrethrum had been confirmed for several stored products insects, but the work had not shown any increase in toxic life of the pyrethrum + piperonyl butoxide spray over pyrethrins alone, as had been claimed.

* Pest Infestation Research, 1950. H.M.S.O. 1s. 9d. (U.S.A., 45 cents).

3. Wettable powders containing respectively DDT, BHC, aldrin and dieldrin had been applied experimentally to bricks, and the residual toxicity of the insecticidal film had been assayed biologically. Two of the preparations had retained their toxicity for 10 months, others had lost it in periods varying from four months to 35 days.

The persistence of residual films of pyrethrum had been tested on a variety of different packing materials; such films had a short life under normal conditions in a warehouse and repeated treatments were necessary. Contrary to expectation, repeated application on softwood samples did not produce films more toxic or persistent than those first laid down.

4. Following laboratory work, a test had been made in a large granary of pyrethrum powder applied to the surface of a bulk of grain for the control of the moth *Ephestia elutella*. For various reasons the results were not absolutely conclusive, but were sufficiently promising to warrant the repetition of the test next year.

Fumigating in Bulk

A method for fumigating existing bulks of grain had become increasingly desirable, and following reports from Canada that carbon tetrachloride might be used for this purpose, a careful investigation of this method had been made. Full-scale tests showed that even penetration of the fumigant could be obtained throughout the contents of a large silo bin by applying the fumigant to the surface of the grain, and the method was now in use by the Ministry of Agriculture and Fisheries. Care had to be taken to protect operatives against toxic effect.

Fumigation with methyl bromide of large stacks of bagged grain under gas-proof sheets had also been the subject of tests.

Special investigations carried out at the request of other departments had included a trial treatment of clothing with methyl bromide on behalf of the War Department, and trials of two methods of disinfesting dried fruits packed in sealed tins carried out for the Admiralty.

The director had continued to represent the Laboratory on the Stored Product Research Sub-Committee of the Colonial Office. Mr. R. W. Howe had returned to the Laboratory after two years spent in Nigeria with the Colonial Office team sent there to organise the control of stored products infestation. As was expected the experience that he gained was already proving most useful and was providing a stimulus for new and interesting lines of research.

Biochemical research on the reaction with foodstuffs had now been linked to the radioactive isotope tracer work, the staff involved forming a Biochemistry Section under the leadership of Mr. F. P. W. Winteringham.

During 1950, 16 papers had been published in scientific journals and 18 lectures and broadcast talks were delivered.

Microanalysts Meet

A JOINT meeting of the Microchemistry Group of the Society of Public Analysts and Other Analytical Chemists with the Bristol and District Sections of the Chemical Society, the Royal Institute of Chemistry and the Society of Chemical Industry was held on 23 April, 1952.

During the afternoon, well-attended visits were made to the chocolate and cocoa works of Messrs. J. S. Fry & Sons, Ltd., at Somerdale, and the University of Bristol Agricultural and Horticultural Research Station at Long Ashton.

At a scientific meeting held in the evening in the lecture theatre of the Chemical Department of Bristol University, a paper entitled 'The Use of Cylinder Oxygen in the Organic Micro-determination of Nitrogen', by H. Swift and E. S. Morton, was read by Mr. Swift. This was followed by an open discussion on 'Standard Substances for Organic Micro-analysis', which was introduced by Mr. G. H. Osborn and in which representatives of users and manufacturers participated.

Cancer—Protective Measures

Questioned in the House of Commons on 6 May about risks of cancer to workers involved in the manufacture of α- and β-naphthylamine and what protective measures were taken, the Minister of Labour, Sir Walter Monckton, said in an oral answer, that precautions depended on the method of manufacture and circumstances of use of the substances. In view of a case now being tried it would be inadvisable to say too much, but the matter was one in which the Senior Medical Inspector of Factories was personally concerned both in research and in observing that all care was taken and he was satisfying himself in those respects.

Oil & the Isle of Grain

Anglo-Iranian's £40,000,000 Project Progressing

PROGRESS in the construction of the new Kent Oil Refinery being built on the Isle of Grain by the Anglo-Iranian Oil Co., Ltd., was revealed in a special visit for members of the Press held on Tuesday, 29 April.

Work on this £40,000,000 project, situated on the marshlands where the Thames and Medway meet, was begun in July, 1950, and when completed will be capable of handling 4,000,000 tons a year of crude oil from the Middle East. The site was selected as it is well placed for the economic supply of products to London and the south east of England, and gives adequate deep-water frontage for shipping.

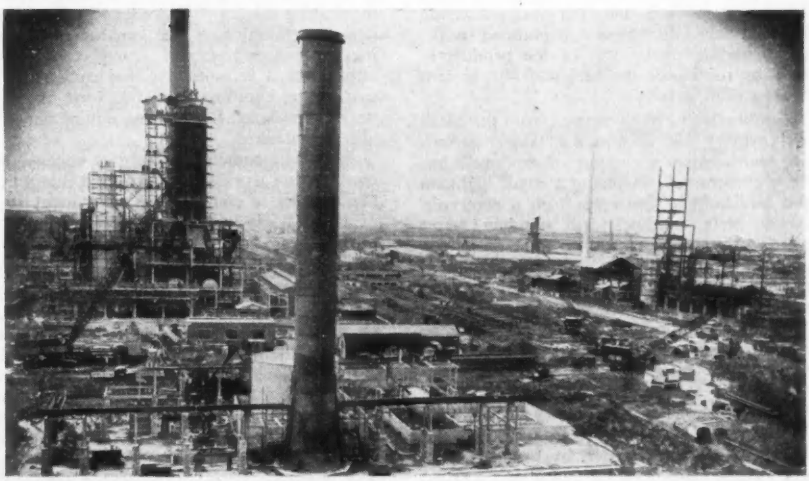
An area of about 2,000 acres was secured for the refinery site, of which 600 acres are now being developed. Most of this area was reclaimed marshland below maximum high tide level, from which it is protected by earth work levees. Layout of the plant has been arranged so that the heaviest pieces of equipment are situated near the good ground of the island where piling is not required. Even so, some 2,000 precast concrete piles varying in length from 15 ft. to 70 ft. were required for the job.

Already several important units can be seen rising above the Grain marshlands, and the first of three constructional stages is well advanced. This stage comprises the crude oil distillation plant and auxiliaries for the sweetening and blending of the main products, together with steam, water and power services.

Stage two calls for the completion early in 1953 of the catalytic cracking plant, for the conversion of the heavier types of semi-refined oils into high-grade motor spirit. A lubricating oil refinery will follow as stage three. Plants for the manufacture of other products requiring special processes may be installed later as a fourth stage.

The hub of the refinery is the distillation unit, through which all crude oil must pass before undergoing any other treatment. Crude throughput capacity of the unit, which is the largest in Europe, is 80,000 barrels a day, or 4,000,000 tons a year.

Incoming crude oil is piped through the stills, or furnaces, and is heated to about 750°F. before it is fed to the fractionating column. Hot oil vapour rises in the column and is taken off in 'cuts' at various levels



A view of the site at the present moment

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from trays where it condenses. Motor spirit is taken from the top of the column, and naphtha, kerosene, gas oil and fuel oil in descending order, are taken from the lower levels.

Residue from the distillation unit is processed in a vacuum unit and certain 'cuts' are fed into the catalytic cracker, which will have a capacity of 10,000 barrels a day, or 500,000 tons a year.

As the name of the unit implies, a catalyst is used to crack or break down oil fractions such as distillate oils in vapour form in order to produce, in this case, high grade motor spirit and butane. The intermingling of catalyst and feedstock takes place in the reactor and the products are drawn off from the fractionating column. The spent catalyst is regenerated for re-use by burning off the coke in the regenerator.

Up to 140,000 tons of lubricating oil a year will be produced at the Kent Refinery. The oils will be manufactured from part of the residue from the distillation unit after further distillation in a vacuum unit. High quality basic grades will be produced after the feedstock has been processed through various units for de-asphalting, extraction, de-waxing and finally clay filtration.

Basic Grades Blending

A further stage will be the blending of basic grades. This will be done at the Kent Refinery's modern blending and packaging installation. From here it is planned to dispatch about 60 per cent of the product in bulk by road, rail and sea, and 40 per cent in 44-gallon barrels.

Cooling water requirements from the Medway estuary will be about 4,000,000 gallons an hour. A new section of sea wall has been constructed, enclosing a small bight on the foreshore in order to form a reservoir. A concrete channel will conduct water nearly three-quarters of a mile from the reservoir to the forebay of the main cooling water pump house. The reservoir and water channel will have a capacity of about 16,000,000 gallons. The reservoir will be filled by tidal action through balanced flap valves and will contain enough water between tides to keep the refinery running at its initial planned throughput.

When water demand increases, the tidal supply will be augmented by three electrically driven low lift pumps, each of 2,000,000 gallons an hour capacity. Four steam turbine pumps, each of 1,500,000 gallons an hour capacity, will be installed.

Maintenance organisation with its staff of 360 will be centred on a large stores and workshops area. The combined stores and workshops building will have a total floor area of 52,250 sq. ft., 38,250 sq. ft. of which will be devoted to workshops and 14,000 sq. ft. to engineering stores. The building will be equipped with two 10-ton overhead travelling cranes and nearly 40 modern machine tools. A separate building of 12,800 sq. ft. will house the chemical stores. The office block will amount to a further 9,400 sq. ft.

As planned, the completed refinery will demand a process steam-load of 430,000 lb. an hour and an electrical supply of 14,500 kW.

To satisfy these requirements five boilers, each of 150,000 lb. an hour evaporation, will be installed together with four turbo-alternators with a total capacity of 16,000 kW. The alternators will operate in parallel with an 11 kV B.E.A. grid supply.

To provide sufficient feed water for the boilers 12 high pressure steam generators will be supplied to evaporate fresh water obtained from local supplies. Water treatment plants, of both lime soda and base exchange types, will be provided.

The refinery will have four deep-water jetties and an additional jetty for loading lubricating oils in bulk and packages. The deep-water jetties will be capable of receiving the largest tankers, 32,000 tons, now afloat and it is estimated that each will be capable of handling 2,000,000 tons of oil a year. The latest fire-fighting equipment will also be installed.

At present some 5,000 men are engaged on construction work. It is expected that when the refinery is completed a permanent staff of about 1,500, will be needed for operating purposes.

Dyers and Colourists Meeting

The Society of Dyers and Colourists announces that the ninth Mercer Lecture was held in Room 104 at the College of Technology, The Newarke, Leicester, on Friday, 9 May, at 6.45 p.m. and was open to the public and members of other societies. The lecture was given by Dr. F. C. Wood on 'Non-felting Wool and Wool Mixtures'. The chairman was H. H. Bowen, president of the Society.

Preparation of Furylacrylic Acid

Foreign Work on Nylon Intermediate

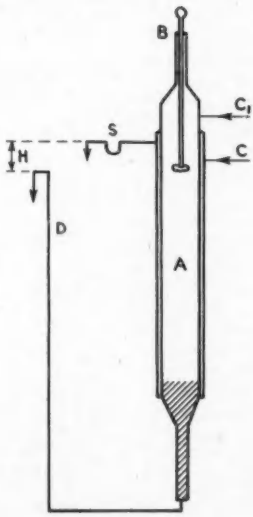
IN recent years the chemistry of furfurol derivatives has extended by leaps and bounds. Since Du Pont de Nemours some years ago announced the use of these as raw material for nylon and other products, many important developments have occurred. Among those proposed or realised is the suggestion by W. Reppe (*Kunstst*, 1950, **40**, 7) for the production of adipic acid from tetrahydrofurane. Somewhat earlier it had been proposed to obtain γ-ketopimelic acid via furylacrylic acid for use in the manufacture of polyamide resins. The γ-ketopimelic acid is a well-known constituent of Igamid 85B. A. Scipioni has recently reviewed these and other possibilities and put forward some of his own on an experimental basis (*La Chim. e l'Ind.*, 1952, **34** (2), 78-81) with special reference to some work by A. Hinz *et al.* (*Berichte*, 1943, **76**, 676) on the preparation of furylacrylic aldehyde with 88 per cent yield.

Scipioni's Method

Scipioni found that the method might be improved in various ways, e.g., using acetaldehyde dissolved at the rate of 1 mol. in 50 cc. water with a mixture of 100 cc. 2 per cent NaOH and 2 mol. furfurol, heated and stirred. Conditions might be varied, such as time of reaction, furfurol/aldehyde ratio, alkalinity of the aqueous phase, or temperature. Formation of the resinous product was specially favoured by increase in temperature and alkalinity, the condensation being that of furylacrylic aldehyde with the acetaldehyde, resulting in products of the type: $C_4H_3O—(CH=CH)_n—CHO$. It was considered, however, that the removal from reaction of the furylacrylic aldehyde as formed, thus avoiding its further condensation or polymerisation, would markedly improve final yields of resinous products.

This was confirmed by using a simple device for ensuring continuous condensation, as shown opposite (this is the subject of pending patent). Reaction vessel A, waterjacketed for heating or cooling, contains aqueous alkaline solution, and is fitted with stirrer B to secure fine dispersion of furfurol fed in at C in admixture with acetaldehyde; also with discharge outlets D for the furfurol/furylacrylic aldehyde mixture insoluble in the aqueous phase, and S for maintaining constant the level of the alkaline aqueous phase, to stabilise the difference in levels H as a function of the specific gravity differences in the two contacting phases. The reaction tube A was 45 mm. in diameter and 500 mm. long, and was filled with 600 cc. of alkaline solution. Temperature could be controlled at the desired level by means of the water jacket, or by the velocity of feed of the mixture, or by NaOH concentration (0.2 to 0.5 per cent), or by the ratio of acetaldehyde to furfurol. Reaction rate is mainly dependent on alkaline concentration and temperature for which there are optimum limits. Yield of furylacrylic aldehyde was 90-95 per cent based on the amounts of the components used, if the rate of feed was 2,000 g./hr. of a mixture of molecular ratio 2 : 1 (furfurol/acetic aldehyde), NaOH concentration was 1 per cent in the aqueous phase, and the temperature was 30°C.

The furylacrylic aldehyde—as also the unsaturated aldehydes—could be oxidised by



the method used by Schmidt as long ago as 1880, but a better way now proposed is to use a silver oxide catalyst with air or oxygen. A somewhat similar reaction tube was used containing NaOH solution in which the catalyst and aldehyde were suspended. The catalyst might be a mixture of silver and copper oxides. Air or oxygen was blown in at the bottom through a layer of porous glass, at the rate of 12 litres per hour. With oxygen there was less polymerisation of the aldehyde and formation of resinous products. In preparing the catalyst it was found best to do this by separate precipitation of the oxides so that the silver oxide covered the copper oxide. Tabulated results show that maximum yield (95.5 per cent) was obtained using 1.6 per cent catalyst containing 21.4 per cent Ag_2O, with 5 per cent aldehyde, 2.15 per cent NaOH; time 3 hours, and temperature 30°C.

In a subsequent paper the author proposes to deal with the preparation of γ-ketopimelic acid and some of its derivatives.

Chemical Engineers

South African Branch Inaugurated

A NOTABLE event in the history of the Institution of Chemical Engineers occurred on 24 March 1952, when its first overseas branch was inaugurated at a meeting held in the University of the Witwatersrand, Milner Park, Johannesburg, South Africa.

The meeting was opened by Dr. B. Segal, chairman of the South African Branch, who outlined the development of the South African Section and the events leading up to the proposed formation of the new branch to a gathering of 41 members and eight visitors assembled in the Senate Room.

Dr. Segal then introduced Sir Harold Hartley, then president of the Institution in Great Britain, and asked him to preside as chairman of the inaugural meeting.

It was a great privilege and pleasure to him, stated Sir Harold, to have the opportunity of presiding at this meeting, which was a great occasion, marking as it did the establishment of the first overseas branch of the Institution, the strength of which lay in its branches. He paid tribute to the vision and inspiration of the late Dr. William Cullen who, 20 years ago, initiated the idea of a South African Branch.

Sir Harold then proceeded with the formal business of the meeting, and read the petition which had been sent to members resident in South Africa, 76 per cent of whom had signed the petition requesting the formation of a properly constituted S.A. Branch. He also read the reply by the council in London, dated 21 February 1952, granting the petition. The list of the provisional committee, as approved by the council in London, was also read and these proposals were unanimously adopted.

The committee elected was as follows: *Chairman*: Dr. B. Segal; *hon. secretary/treasurer*: M. Salomon; *members of the committee*: Dr. Taberner, Dr. McLachlan, K. W. Findlay, and H. Williams.

As the S.A. Branch had now been formed Sir Harold invited Dr. Segal to take over the chair.

Draft rules of the new branch, which had previously been sent to all members, were then considered. The chairman explained that these were modelled on rules of similar branches in Great Britain and would be forwarded to London for adoption by the parent body.

In his address to the meeting, Sir Harold said that his pleasure in conducting the proceedings had been greatly enhanced by the fact that the meeting was held at the University at which his present host, pupil and colleague of many years ago, was the principal.

Tribute Paid to Quinan

He then referred and paid a tribute to the great genius of Kenneth B. Quinan, particularly as revealed in his chemical engineering planning during the first world war, and considered him as one of 'the fathers of British Chemical Engineering.'

Sir Harold then proceeded to review the progress of the science of Chemical Engineering in the last 50 years. His talk was freely adorned by incidents from his wide experience, the theme running through his remarks being the basic needs of the world in energy, food, metals and raw materials, and the duties and problems in these matters which chemical engineering science would be called upon to perform and to solve.

In conclusion, Sir Harold emphasised that in spite of our consciousness of the 'separateness' of chemical engineering, the science and the practitioner were not competitive but complementary to other branches of engineering.

The Chemist's Bookshelf

INTRODUCTION TO CARBOHYDRATE BIOCHEMISTRY. By D. J. Bell. 3rd edition. 1952. London University Tutorial Press. Pp. viii + 100. 6s.

The vigour of research and the enormous span of specialised knowledge which together characterise the study of biochemistry to-day, have not failed to exert their influence on the presentation of the subject in contemporary textbooks. More and more, although we may admire, even stand in awe of the man who attempts to write a textbook of biochemistry singlehanded, we are forced to acknowledge something foolhardy in the assault; for the journals appear faster than a man can read, and certainly outstrip his pen.

The subject, however, must have its literature of exposition and comment, and the demise of the standard textbook, for any but the most elementary treatment of the subject, is in fact a clarion-call for the re-emergence of the monograph; and for the monograph three qualities may be deemed paramount. First, that the text should be strictly limited in its scope, to correspond with the limitations of the author's first-hand experimental experience; secondly, that it should be concise, and so, readily revised at short intervals, for the monograph must be dynamic above all things if it is to prove its worth; and lastly, that it should have the courage to minimise the conventional 'build-up' of a subject and so allow the emphasis of the treatment to dwell on its advancing fringe.

We may, on all these counts, congratulate Dr. Bell on the appearance of this third edition of his book on Carbohydrate Biochemistry. The value of this book has not been in question since the first edition was published in 1940, and it is here mainly necessary to comment on the way in which new materal has been assimilated without the slightest lengthening of the text.

We may instance the re-writing of the section on amylase action; new sections on the oxidation of glucose-6-phosphate and its rôle in pentose synthesis, and a much improved chapter on the synthesis of polysaccharides and on the problem of transglycosidation generally; and finally a wholly successful abridgement of the author's earlier exposition of the well-known fermentation and glycolytic processes. In this last connection, although it is undoubtedly difficult to portray the fermentation scheme in its entirety on one small page, Dr. Bell might well consider whether his own preferred 'spiral' arrangement is not in fact calculated to multiply his difficulties. One other small point may be mentioned, concerning the representation of the ring forms of the sugars: the formula for lactose (p. 15), although correct, is not given in the same structural 'idiom' which the author has chosen for the other sugars for which he has given the ring structure.

Professor F. G. Young writes the foreword to this new edition, and it is with pleasure that one echoes his commendation of its worth '. . .to chemists and biochemists alike'.—F.N.M.

ANORGANISCHE CHEMIE. By Professor Dr. Wilhelm Klemm. Berlin, Walter de Gruyter. 1952. Pp. 184. Dm. 2.40.

This book, No. 37 of the Göschen Series on Natural Sciences and Technique, is the seventh edition of what is considered a brief and yet concise compendium of inorganic chemistry. The author, a professor at Münster University, describes in encyclopaedic way the links of chemistry and physics. After an introductory chapter, the book deals in 32 divisions with the laws, general principles and the properties of various inorganic compounds, incorporating recent scientific information. The little book presents both theoretical and practical data supplemented with 18 figures, bibliographic references and a detailed names and subject index. Although it can hardly be recommended as a text book for students of chemistry, it will surely be a worthwhile accessory for everyman's bookshelf.—F.N.

HOME

Scottish Analysts' Meeting

An ordinary meeting of the Scottish Section of the Society of Public Analysts and Other Analytical Chemists was held on 7 May in the North British Hotel, Edinburgh. Mr. H. C. Moir presided and forty-two members and friends were present. A lecture entitled 'Chemistry and the Law', was given by J. K. McLellan, M.A., B.Sc., A.R.I.C. The lecture was illustrated by lantern slides and exhibits, and a discussion followed.

Improved Salt Plant

Introduction and full-scale operation of a new and highly mechanised vacuum salt plant by the Salt Division of Imperial Chemical Industries, Ltd., at its Stoke Works, near Bromsgrove, has led to the dismissal of some staff. General services and maintenance in the works has been reorganised to improve efficiency, and it is hoped that some of the men may be taken back at the works as expansion continues.

Large Works Purchased

Chamberlain & Willows, Factory Agents, of 23 Moorgate, E.C.2, have recently been concerned in the disposal of two large chemical works. Freehold premises of 100,000 sq. ft. at Godalming, Surrey, have been sold through their agency to British Drug Houses Ltd. (Messrs. Debenham Tewson & Company acting for the purchasers), and Freehold Soap Works of the same size at Stratford, E.15, have been acquired on behalf of Messrs. Metallo Chemicals, Ltd. (Messrs. Henry Butcher & Company acting for vendors).

Agriculture Group—Summer Meeting

The summer meeting of the Crop Protection Panel of the Agriculture Group of the Society of Chemical Industry will be held on Wednesday, 4 June. By invitation of Imperial Chemical Industries, Ltd., a visit will be made to the Hawthorndale Laboratories, Jealott's Hill Research Station, Bracknell, Berks. Coach transport will be provided and will leave Northumberland Avenue at 9.30 a.m. arriving about 11 a.m. Members travelling direct should endeavour to arrive at Bracknell about this time. Anyone wishing to participate should apply to the secretary, Dr. R. A. E. Galley, before 21 May.

New Drug Available

Terramycin, discovered after the development of streptomycin, became available for general practitioners in England, Scotland and Wales as from 12 May. The drug may be used by hospitals in treatment of any condition they think suitable. Family doctors, however, may only use it for certain conditions, one of which is pneumonia.

Society of Public Analysts

An ordinary meeting of the Society of Public Analysts and Other Analytical Chemists was held on 7 May in Burlington House, London. Dr. J. R. Nicholls, C.B.E., F.R.I.C., was in the chair, and the following papers were presented and discussed:—'A Routine Method for the Analysis of Table Jellies', by Miss E. M. Chatt, B.Sc., F.R.I.C. 'The Determination of Oxalates in Fresh Plant Material', by C. J. L. Baker, A.R.I.C. 'The Determination of Small Quantities of Ammonium Di- or Tri-ethanolamine Alginate in Rayon-Finishing Solutions and on Rayon Yarn', by E. G. Brown, A.M.C.T., F.R.I.C., and T. J. Hayes.

Wrexham Measures Pollution

First calculations of air pollution at Wrexham were received by the Borough Health Committee on 6 May. One gauge in the town centre registered deposits of 18.16 tons of soot and grit per sq. mile in a month. A second gauge on the fringe of the borough at Rhosnessney recorded deposits of 7.49 tons. At both sites the amount of sulphuric acid in the air was almost the same. After discussing a report by Mr. A. McCartney (Chief Sanitary Inspector) the Committee decided to renew their application to the Ministry of Health to approve a by-law to enforce control of smoke. In a letter to the committee, Ald. H. Hampson suggested the Council should tell the Ministry that the smoke nuisance was intolerable.

More Water for Harwell

The Thames Conservancy Board at its meeting on 12 May agreed that the permitted maximum quantity of water to be taken from the Thames at Sutton Courtenay for the Atomic Energy Research Establishment at Harwell, should be increased from 1,000,000 to 1,750,000 gallons a day.

· PERSONAL ·

The Council of the Royal Society has appointed MR. E. M. GUNNERSEN, a graduate of Melbourne University, as the first Rutherford Scholar for three years from 1 October, 1952, to carry out work in nuclear physics at a university in the United Kingdom.

MR. MAGNUS HERD, chief assistant city analyst in Glasgow, has been appointed City Analyst and Public Chemist in Glasgow, in succession to the late A. R. Jamieson. Mr. Herd, who is 49, has been with the city for many years and has a wide experience of work in the food and drug field, in sewage purification work, in water, atmospheric pollution, and in forensic and toxicological analyses. The Department is stated to be one of the most extensive in the country, examining some 11,000 samples in all fields in the course of a year.

It is announced that DR. H. HOLLINGE, O.B.E., will, at the end of June this year, relinquish his appointments as Director of the London Research Station of the Gas Council and as Controller of Research, North Thames Gas Board.

DR. R. H. GRIFFITH has been appointed by the Gas Council to be the Director of the London Research Station and by the North Thames Gas Board to be their Controller of Research.

At a meeting of the council of the Association of the British Pharmaceutical Industry held in London on 6 May, 1952, MR. C. L. PAUL, B.A. (Boots Pure Drug Co., Ltd.), a former president of the Pharmaceutical Export Group, was elected president of the association and MR. J. F. BOUCHER, M.P.S. (Ferris & Co., Ltd.), was elected vice-president. In order to implement the decision made at the annual general meeting for a more active public relations policy, the following were appointed to a new Public Relations Committee:—J. F. BOUCHER (Ferris & Co., Ltd.), H. C. H. GRAVES (Vitamins, Ltd.), J. C. HANBURY (Allen & Hanburys, Ltd.), H. ASHLEY MASON (Evans Medical Supplies, Ltd.), and LESLIE D. SMITH (Sangers, Ltd.).

MR. S. C. TYRRELL, F.C.W.A., F.I.I.A., becomes this year's president of the Institute of Cost and Works Accountants. His election to this office will take place at the Palace Hotel, Buxton, on 17 May. Mr. Tyrrell is a local director and chief accountant of the Newton Chambers & Co., Ltd. group of companies, Sheffield, ironfounders, engineers and chemical manufacturers. He is the chairman of the Costing Committee of the T. & I.P.A. which produced the Manual of Uniform Cost Accounting for Steel Fabricating and Kindred Industries, and is the author of a number of papers on accounting and management subjects.

R. L. CHATTERSON, formerly assistant to the Director of Production, at North British Rubber Co., Ltd., Edinburgh, has been appointed general works manager at Edinburgh and Dumfries. He now assumes full responsibility for production at the company's plants.

The following retiring directors were re-elected by shareholders at the annual meeting of The International Nickel Company of Canada, Ltd., held on 30 April:—

I. C. RAYMOND ATKIN, vice-president, J. P. Morgan & Co., Inc.; GORDON R. BALL, vice-president and general manager, Bank of Montreal; JAMES S. DUNCAN, C.M.B., chairman and president, Massey-Harris Co., Ltd.; WILLIAM J. HUTCHINSON, treasurer of the company; THE RT. HON. LORD MCGOWAN, K.B.E., director of banking and insurance companies; DONALD H. MCLAUGHLIN, president, Homestake Mining Company; DR. PAUL D. MERICA, executive vice-president of the company; SIR OTTO E. NIEMEYER, C.B.E., K.C.B., director of financial companies; LAURENCE S. ROCKEFELLER, investment and financing of business enterprises; GRANT B. SHIPLEY, chairman, Elliott Company; R. EWART STAVERT, president, The Consolidated Mining and Smelting Company of Canada, Ltd.; J. C. TRAPHAGEN, chairman, Bank of New York and Fifth Avenue Bank; and HENRY S. WINGATE, vice-president and secretary of the company.

OVERSEAS

New Belgium Plant

A large sodium tripolyphosphate plant has been erected near Zandvoorde, in the neighbourhood of Ostend, by Union Chimique Belge. Production began in March and the first large shipments were made by coasting vessels direct from the factory quay.

Italian Sulphur Operations

Both British and American firms are reported to be making trial drills for sulphur in Sicily and Calabria, and believe there are fresh deposits of sulphur waiting to be tapped at a depth of about 1,000 feet. It is not stated whether these deposits are purer than existing Italian mines, where it is not practicable to use the Frasch process as practised in the U.S.A. Italian firms are anxious to develop native sulphur deposits, but 60 of them complain that they need another £9,000,000 aid, over and above grants last July totalling £5,000,000, for new equipment. A long miners' strike in February cut monthly sulphur production by one-third. Wage demands were finally met and work is now in progress again.

U.S. Synthetic Fibre Production

A programme to expand American capacity to produce synthetic fibres, such as nylon and rayon, is being considered by the Defence Production Administration, according to a statement by the agency's chief, Mr. Fleischmann. Only four certificates of necessity have so far been issued for expanding synthetic capacity, he said, while there is a waiting list of 25 to 30 applications. An expansion programme for synthetic fibres was first considered last summer, but was abandoned when world wool values tumbled.

Sulphur Shortage to Continue

Shortage of sulphur is likely to continue according to the first annual report of the International Materials Conference, recently issued in Washington. World demand for sulphur this year is estimated at about 14,000,000 tons whereas production is only expected to be 12,300,000 tons, including 6,100,000 tons of pure sulphur and 6,200,000 tons of sulphur-bearing materials. The deficit of 1,700,000 tons is also predicted for 1953.—B.U.P.

German Potash Output

Potash mines in Western Germany are now accounting for almost a quarter of world production, against 50 per cent supplied by the whole of Germany before the war. Output of crude potash (K_2O) in the year June, 1950-51, are said to have totalled 1.2 million tons, in spite of the fact that of the 54 German mines only 19, with 38 per cent of total capacity, are situated in Western Germany.

U.S. Chemicals and Railways

Consistent refusal of the railways to establish special large tonnage rates for chemical manufacturers in the U.S.A. is now reported to be having its repercussions. The chemical manufacturers are making every effort to lessen their dependence on the railways for transport by using sea and inland waterways. A more important long-term trend is the production of chemicals in more concentrated forms to reduce their bulk and weight. —B.U.P.

Sulphuric Acid Plants for S. Australia

A £A.1,500,000 plant for the extraction of sulphuric acid from pyrites, mined in South Australia, is being planned for Adelaide, the State capital. Production is estimated at 100,000 tons of acid a year, sufficient to make 300,000 tons of superphosphate. Mining of pyrites is carried out at Nairn, and most of the superphosphate produced in South Australia is made in the Port Adelaide district. A new plant at Port Pirie will also produce sulphuric acid by use of sulphur fumes from the smelting industry.

New Pilot Plant

The Carbide and Carbon Corporation has opened a big new pilot plant in West Virginia for the hydrogenation of coal. The process, while essentially the same as that used in Germany, has been perfected and slightly changed. Bituminous coal from nearby mines is used.

Norwegian Aluminium Industry

The aluminium works at Årdal in Sogn, which were partly built by the Germans during the war, but were taken over by the Norwegian State and completed on the liberation, has published its accounts for 1951. Production of aluminium amounted to 24,000,000 tons, and gross profit reached a value of £1,500,000.

Publications & Announcements

A HIGH value, glass enclosed resistor of high stability suitable for use in the very small current circuits of radiation-detecting and monitoring equipment is the Morgan Megistor described by the Morgan Crucible Co., Ltd., in its latest leaflet (reference YD.1) just issued. Megistors cover a range of 10^7 to 10^{13} ohms and are approved by the Ministry of Supply to the Atomic Energy Research Establishment specification 390. The robust resistance element is sealed in an evacuated glass envelope, the outside of which is coated with a water-repellent silicone lacquer, rendering it immune to adverse climatic conditions. Megistors are suitable for working in the range 0° to +60°C. Preliminary tests indicate that the range can probably be extended downwards to −60°C. In order to avoid chemical contamination, and the introduction of stray electric charge, it is important that Megistors should be handled only by the wire leads. They are supplied individually sealed in transparent polythene envelopes to facilitate storage and handling. Should one inadvertently become contaminated, for example, by touching by hand, cleansing may generally be effected by rinsing in alcohol.

* * *

'GAS, its treatment and storage', is the title of a brochure issued by Ashmore, Benson, Pease & Company, a subsidiary of the Power-Gas Corporation, of Stockton-on-Tees and London. Brief descriptions are given of gas works plant which the company regularly manufacture, and illustrations are shown of a variety of types of gasholders, as well as purifiers and condensers. Ashmore, Benson and Pease have been specialists in their subject for over 80 years.

* * *

MONSANTO Chemicals, Ltd., have produced a booklet on the main chemicals they manufacture for the rubber industry. The description of these is necessarily brief, but the individual products are covered by technical bulletins referred to in the text. The scope of the booklet covers accelerators, antioxidants and various ancillary products, their specifications and physical and chemical properties. Copies of the publication may be obtained from the company at Victoria Station House, London, S.W.1.

THE BRITISH Plastics Year Book for 1952, published by Iliffe & Sons Ltd., of Dorset House, Stamford Street, London, S.E.1, is now available (price 30s.). This very comprehensive guide to the Plastics industry has the same format and lay-out as last year's edition, which was itself revised and modernised. The new classification of materials, manufactured products, plant and equipment introduced last year has been retained, and considerable extensions have been made in most sections of the book, with the result that it is larger and more comprehensive than ever before. The individual sections cover a review of patents in all the various fields concerning the plastics industry; a classified list of raw materials, resins, solvents, fillers, etc., used and produced; a classified list of manufactured products made by the industry, and of plant and equipment; a glossary of terms, including proprietary names, although for some reason neither 'Ardil,' 'Dacron,' 'Orlon,' nor 'Laconite' are included, and 'resorcinol' is called 'esorcinol'; a list of names and addresses, a Who's Who, a list of associations and federations to do with the plastics industry, and a section on technical data.

* * *

THE Pyrene Co., Ltd., of Brentford, Middlesex, have issued their May number of 'The Bonderiser'—a publication dealing with the application of bonderising to various fields in industry. Previous issues have dealt with applications of the process to the treatment of metal surfaces prior to painting, but this number describes a new bonderising range specifically developed for assisting the cold working of metals. Photographs are shown of applications in the wire drawing, tube drawing and other industries, and actual examples of the process in industry are given. Copies of 'The Bonderiser' may be obtained from the company at Brentford.

* * *

A BOOKLET giving all the aspects of a main product, hydrogen peroxide, has recently been published by Laporte Chemicals, Ltd. This gives the history of the compound, its chemical and physical properties, strengths, grades manufactured, containers for it, constructional materials for handling and storing it, methods of analysis and some of its many various uses.

Commercial Intelligence

The following are taken from the printed reports, but we cannot be responsible for errors that may occur.

Mortgages and Charges

(Note.—The Companies Consolidation Act of 1908 provides that every Mortgage or Charge, as described herein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every company shall, in making its Annual Summary, specify the total amount of debt due from the company in respect of all Mortgages or Charges. The following Mortgages or Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced.)

BIOREX LABORATORIES, LTD., London, E.C., chemical manufacturers, etc. (M., 17/5/52). 7 April, mortgage, to Martins Bank, Ltd., securing all moneys due or to become due to the bank; charged on certain contract moneys. *Nil. 19 November, 1951.

Satisfaction

MACROME, LTD., Wolverhampton, metallurgists. (H.S., 17/5/52). Satisfaction, 10 April, of first debenture registered 18 November, 1947 (fully).

New Registration

Pfizer, Ltd.

(F.4203). Particulars filed 6 May pursuant to Section 407 of the Companies Act, 1948. Capital stock: 10,000 shares of a par value of $100 per share. Manufacture, import and export chemical, medical and pharmaceutical products.

Company News

British Enka, Ltd.

The curtailment of sulphur supplies, which for a time necessitated the purchase of sulphur and acid at high prices, was referred to by the chairman, Mr. A. D. Carmichael in his statement at the 27th annual general meeting of British Enka, Ltd., held in London on 2 May. In order to assure future supplies of sulphur the company had joined with other producers of rayon and chemical users in a project for the production of sulphuric acid from anhydrite. The company had agreed to take up 81,081 shares of £1 each at par in the United Sulphuric Acid Corporation, Ltd., a company with a subscribed capital of £1,200,000. Production was due to begin in 1954-55. Net profit for the year amounted to £419,415 (£300,241). Dividend of 10 per cent on ordinary stock was recommended.

Imperial Chemical Industries

The board of directors of Imperial Chemical Industries, Ltd. announce that they have decided to recommend a final dividend on the £60,558,139 Ordinary stock of the company already issued at 31 December, 1951, of 10 per cent (less income tax at the United Kingdom standard rate for 1952/53) making with the interim of 3 per cent a total of 13 per cent for the year 1951 (12 per cent in 1950).

The group profit before taxation, for the year 1951, after charging £8,892,892 for depreciation (£8,694,823) amount to £40,057,501 (£31,018,457).

The provision, on the basis of the year's income, for United Kingdom and Overseas taxation after reduction by £2,782,395 (£2,892,460) in respect of past over-provisions, amounts to £16,557,129 (£12,455,692). The group profit after taxation is therefore £23,500,372 (£18,562,765).

Appropriations by subsidiaries to reserve for deferred income tax liability due to initial allowances amount to £63,020 (£106,185). Dividends and undistributed income of minority members of subsidiaries amount to £761,587 (£605,820) and the company's share of undistributed income of subsidiaries is £2,293,217 (£1,006,848).

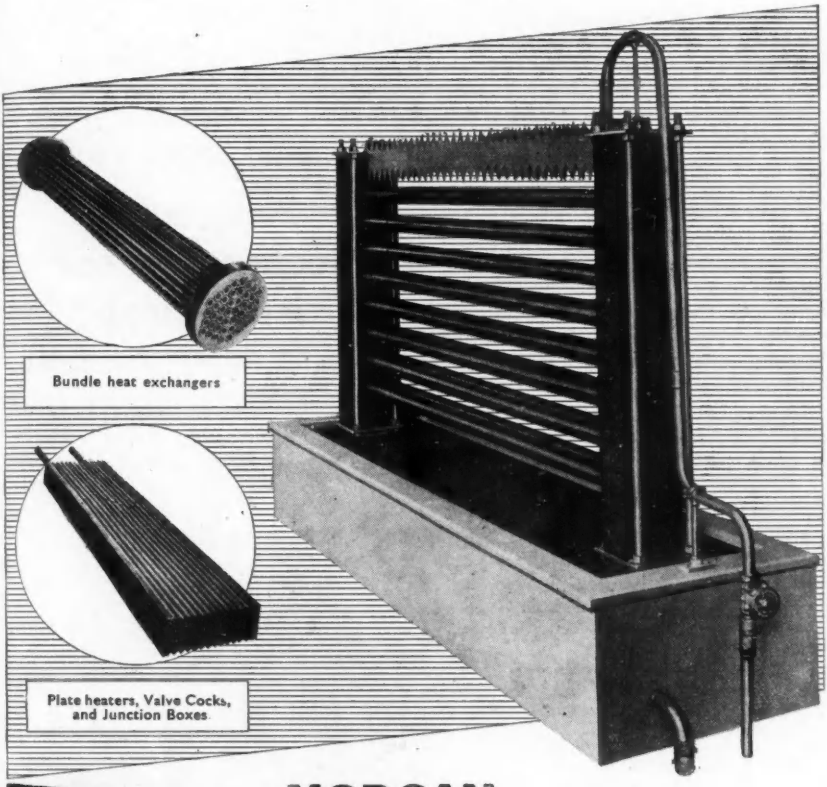
The net income of the company for the year 1951 is therefore £20,382,548 (£16,843,912). The total amount available for appropriation, including £4,424,588 (£4,328,249) brought forward from the previous year in £24,807,136 (£21,172,161).

The board have appropriated £2,944,000 (£2,960,000) to reserve for deferred income tax liability due to initial allowances, £5,000,000 (same as in 1950) to obsolescence and replacement of assets reserve and £7,000,000 (£4,000,000) to stock replacement reserve.

The 25th ordinary general meeting of the company will be held at Wigmore Hall, 36 Wigmore Street, London, W.1, on 19 June, 1952, at 11.30 a.m.

Greeff Chemicals Holdings, Ltd.

Profit of the Group of Greeff Chemicals Holdings, Ltd., for the year ended 31 December, 1951, amounted to £136,823 compared with £73,666 in the previous year. Interim ordinary dividend was 4¼ per cent less tax. Final dividend proposed 8 per cent and bonus 7¼ per cent (8¼ per cent and 5 per cent). Annual general meeting will be held on Thursday, 12 June.



MORGAN CARBINERT

FOR THE CHEMICAL AND PROCESS ENGINEER

CARBINERT (Impervious Graphite) with its high rate of heat transfer and its exceptional resistance to most acids and alkalis, is a robust material whose ever-widening scope of activity offers vast potentialities.

The **CARBINERT** Plate heater illustrated is of a sturdy construction capable of withstanding internal steam pressure of 25/30 lb./in.². This type of plate heater is being adopted extensively for heating all kinds of chemical vessels and is particularly suited for use in steel pickling baths.

For further details on application write for Booklet P.11.

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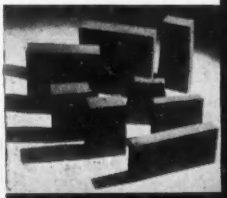

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Next Week's Events

MONDAY 19 MAY

Incorporated Plant Engineers

Liverpool: Radiant House, Bold Street, 7.15 p.m. C. N. Hillier: 'Pumps and Pumping'.

TUESDAY 20 MAY

Society of Chemical Industry

London: Royal College of Science, South Kensington, S.W.7. Agriculture Group, 2.30 p.m. Annual general meeting; 3 p.m., Sir Herbert Howard (secretary, Commonwealth Agricultural Bureaux Executive Committee, Farnham Royal, Slough, Bucks): 'The Commonwealth Agricultural Bureaux'.

WEDNESDAY 21 MAY

Society of Chemical Industry

Tiverton, Devon: 8.30 a.m., with RIC, Bristol and District Section, and the Chemical Society. All-day visit to works of John Heathcoat & Co., Ltd.

Institution of Chemical Engineers

Birmingham: University, Edmund Street, 6.30 p.m. Graduates' and Students' Section, Midlands Centre. Symposium on: 'The Research Work of the University of Birmingham Chemical Engineering Department'.

Royal Institute of Chemistry

East Croydon: London and South-Eastern Counties Section. Annual golf meeting, Shirley Park Golf Club.

THURSDAY 22 MAY

The Royal Society

London: Burlington House, Piccadilly, W.1, 8.30 p.m. Conversazione and exhibition.

FRIDAY 23 MAY

The Royal Institution

London: 21 Albemarle Street, W.1, 9 p.m. Sir Harold Spencer Jones (Professor of Astronomy; Astronomer Royal): 'Continuous Creation'.

Biochemical Society

Cardiff: Physiology Institute, Newport Road, 2 p.m. Reading of scientific papers.

CLASSIFIED ADVERTISEMENTS

SITUATIONS VACANT

The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order, 1952.

A **CHEMICAL PLANT MANAGER** is required by **LAPORTE CHEMICALS LIMITED** at their Warrington works. Applicants should have a Degree in chemistry or chemical engineering or the equivalent, with good industrial experience. A pension scheme is in operation. The salary offered will be in accordance with qualifications and experience. Apply to **THE SECRETARY, LAPORTE CHEMICALS LIMITED, HANOVER HOUSE, 14, HANOVER SQUARE, LONDON, W.1,** giving details of age, education, qualifications and experience.

EXPERIMENTAL OFFICERS AND ASSISTANT EXPERIMENTAL OFFICERS in various Government Departments. The Civil Service Commissioners invite applications for permanent appointments to be filled by competitive interview during 1952. A closing date for the receipt of applications earlier than December, 1952, may eventually be announced either for the competition as a whole or in one or more subjects.

The posts are divided between following main groups and subjects: (*a*) Mathematical and Physical Sciences; (*b*) Chemistry and Metallurgy; (*c*) Biological Sciences; (*d*) Engineering subjects; and (*e*) Miscellaneous (including, *e.g.*, Geology, Library and Technical Information Services).

AGE LIMITS: For Experimental Officers, at least 26, and under 31 on 31st December, 1952; for Assistant Experimental Officers at least 18 and under 28 on 31st December, 1952. Extension for regular service in H.M. Forces.

Candidates must have obtained, or be taking examinations during 1952 with a view to obtaining, the Higher School Certificate with mathematics or a science subject as a principal subject, or the General Certificate of Education in appropriate subjects, or the Higher National Certificate or other specified qualifications. Candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. Candidates over 20 will generally be expected to have higher qualifications.

Inclusive London salary scales:—

Experimental Officer: £628-£786 (men); £533-£655 (women).

Assistant Experimental Officers: £275-£586 (men) £275-£489 (women).

Starting pay according to age up to 26: At 18, £275; at 26, £498 (men); £467 (women).

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Further particulars and application forms from the **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1,** quoting No. S94-95/52. Completed application forms should be returned as soon as possible. 16327/100/JW.

WANTED by Manufacturer in N.W. London, a **LABORATORY ASSISTANT** to learn the routine Chemical and Physical principles of the processes and eventually take over the responsibility of laboratory. Type and nature of general experience more important than academic distinction. Write fully in confidence **BOX No. C.A. 3145,** THE CHEMICAL AGE, 154, Fleet Street, London, E.C.4.

SITUATION VACANT

LONDON BRICK COMPANY, LIMITED, has a vacancy for a Senior Research Worker—who should be an Honours Graduate in Physics, Chemical Engineering or Metallurgy—to take charge of the section carrying out fundamental investigations of Kiln operation and design. The work includes the laboratory study of the flow of gases through ports, ducts and chambers, the investigation of the mechanism of the transfer of heat to clay goods, and the application of the knowledge so gained to the design and operation of kilns and dryers.

The salary will be commensurate with the applicant's qualifications and experience.

A house will be available for the successful applicant.

Apply, giving full particulars of qualifications and experience, to: **LONDON BRICK COMPANY, LIMITED, AFRICA HOUSE, KINGSWAY, LONDON, W.C.2.**

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JACKETED BOILING PANS

1,500 gal., 200 gal., 150 gal., 100 gal. and 40 gal., any of which can be fitted with stirring gear.

ONE Jacketed **DISINFECTOR,** 200 gal. capacity, detachable hinged ends, quick-release swing bolts.

ONE 200 gal. Vertical **MIXING TANK,** arranged with mixing gear driven through bevel gears from fast and loose pulley.

ONE 200 gal. capacity M.S. **AUTOCLAVE** of riveted construction; dished bottom; hinged cover; quick-release swing bolts.

ONE 300 gal. capacity M.S. **AUTOCLAVE,** as above.

"MORWARD" "U"-shaped TROUGH POWDER MIXERS, in sizes 8 to 100 cu. ft. capacity, arranged with scroll type mixing gear, automatic discharge, electrically driven through reduction gear.

TWO Alfa Laval Centrifugal **SEPARATORS** and several **HOPKINSON CENTRIFUGES,** types 2, 3 and 4, arranged with built-in motors and pumps.

Numerous **HYDRO EXTRACTORS** in stock, 30 in., 60 in. and 72 in. **BROADBENT** and 42 in. **WATSON LAIDLAW.**

Inquiries invited.

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FOR SALE

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FOURTEEN various open-top **STORAGE TANKS,** riveted, capacities from 300 gallons to 9,800 gallons. Last used for oil or varnish.

1½, 2½ and 3½ size belt-driven **DISINTEGRATORS** by Christy & Norris or Harrison Carter.

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Robinson 3-sheet No. 1 size **CENTRIFUGAL DRESSING MACHINE** for dry powders, etc.

Four **ROTARY BOWL MIXERS,** 5 ft. diam., cast-iron built, inclined agitators by Baker Perkins.

One excellent **EVAPORATING UNIT,** comprising Copper Vessel, 4 ft. diam. by 5 ft. 6 in. deep, jacketed on the bottom, with copper swan-neck, C.I. catch-pot, vacuum pump and fittings including thermometer and gauge.

Large unjacketed **WERNER MIXER,** belt and gear driven, hand tipping, double " Z " arms, pans 31 in. by 45 in. by 36 in. deep.

No. 200 One nearly new **WERNER PFLEIDERER JACKETED MIXER OR INCORPORATOR.** Low type, with C.I. built mixing chamber. 28 in. by 29 in. by 27 in. deep, with double " U "-shaped bottom which is jacketed, and double fish-tail or fin-type agitators geared together at one side, with belt-driven friction pulleys, 34 in. diam. by 5 in. face, with hand-wheel operation and hand-operated screw tilting gear. Machine fitted with machine-cut gears, covers, gear guard, cast-iron baseplate, and measuring overall approximately 7 ft. by 6ft. by 4 ft. high to the top of the tipping screw.

No. 209 One **HORIZONTAL " U "-SHAPED MIXER,** steel built, riveted, measuring about 8 ft. 3 in. long by 3 ft. wide by 3 ft. 3 in. deep, with horizontal shaft, fitted with bolted-on mixing arms about 18 in. long by 4 in. wide, with intermediate breakers, and driven at one end by a pair of spur gears, with countershaft, fast and loose belt pulleys, outer bearing and plug cock type outlet at the opposite end, mounted on two cradles fitted to two R.S.J. running from end to end.

Two **FILTER PRESSES,** each fitted 68 wood recessed plates, 2 ft. 8 in. square, centre fed, with enclosed bottom corner delivery, cloth clips and belongings.

One **DEHNE FILTER PRESS,** cast-iron built, fitted 45 recessed ribbed plates, 2 ft. 8 in. by 2 ft. 8 in. by 1½ in., with bottom corner feed, cloth clips and bottom corner separate outlets, angle lever closing gear, etc.

SIMON HORIZONTAL TUBULAR STEAM-HEATED DRIER, barrel with steam-heated tubes, 12 ft. long by 5 ft. diameter.

Further details and prices upon application.

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GRAVITY Roller Conveyor severa lengths, Rolls. 2½ in. diam. by 16 in. 3 in. centres. Good condition. **THOMPSON & SON (MILLWALL), LIMITED, CUBA STREET MILLWALL E.14.** (Tel. : East 1844.)

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DRYING PLANT

ROTARY DRYER by Stothert & Pitt. Drum, 30 ft. by 3 ft. diam. int. Motorised 400/3/50. Heated by solid fuel firebox, refractory lined.

ROTARY DRYER, 53 ft. by 5 ft. 3 in. diam. Driven through girth wheel with reduction gear. Discharge hopper, fan, ducting, etc.

ROTARY DRYER, 45 ft. by 4 ft. diam. in six bolted sections, each 7 ft. 6 in. long, mounted on two sets trunnions driven by girth wheel and pinion. Pinion shaft fitted driving pulley, final drive requiring 7½ h.p. Motorised 400/3/50.

Simon Twin **ROLLER DRYER,** 8 ft. 4 in. by 36 in. diam. Double gear driven through 1½ in. pitch, 3-start worm and phosphor-bronze rim wheel, 60 teeth, totally enclosed gears. 80 lb. w.p. on rolls. Motorised. Ducting available.

Two Steam-jacketed **ROTARY VACUUM DRYERS,** each 17 ft. 8 in. by 4 ft. 6 in. diam. Manhole in barrel with cover. Mounted on roller tracks and driven through glanded trunnion bearings. Discharge through S.J. chamber.

Gas-fired **OVEN** by Bertram Thomas. Internal dimensions 3 ft. wide by 3 ft. 3 in. high by 2 ft. 6 in. with removable framework for trays. Two burners, fitted governor and Spersom regulator. Double swing doors.

Semi-Muffle **OIL-FIRED FURNACE** by Incandescent Heat Co. Fitted twin burners, brick lined, 3 ft. by 2 ft. by 1 ft. 6 in. high. Temperature range, 0-1300° C.

Gas-fired **OVEN** by Ballard. Internal dimensions, 2 ft. 8 in. by 2 ft. 8 in. by 5 ft. high. Twin gas burners with Spersom regulator. Swing door with thermometer range 50/650° F.

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INFRA-RED DRYING TUNNEL by Metropolitan-Vickers. Overall dimensions, 26 ft. long by 3 ft. 9 in. wide by 5 ft. 5 in. high. Conveyor, 18 in. wide for trays 25 in. by 16½ in., driven by ¼ h.p. 400/3/50 geared motor. Electrical loading is 15 kW., 110 V., wired in two series for 200 V. single-phase and controlled by five 3-heat switches.

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TABLET MACHINE, single-punch, by Wilkinson.
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MIXER or **BLENDER,** 30 in. diam. by 30 in. deep, for dry or semi-dry materials.
MIXER TIPPING PAN, type 44 in. by 34 in. by 31 in. deep.
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Stainless Steel **FILTER TANK,** 3 ft. 6 in. diam.
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FOUR Papier-mache O.T. **TANKS,** 8 ft. 6 in. diam., 8 ft. deep. (Unused.)
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Free Catalogue, "Watkins Machinery Record," available.
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4,000-GALLON unused W.S. Enc. **TANKS,** 15 ft. by 7 ft. by 7 ft.
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WORKING NOTICES

THE Proprietors of PATENT NO. 601,290 for "CELLULOSE BLEACHING," desire to secure commercial exploitation by licence in the United Kingdom. Replies to **HASELTINE LAKE & CO., 28, SOUTHAMPTON BUILDINGS, CHANCERY LANE, LONDON. W.C.2.**

THE Proprietor of British **PATENT No. 617,877,** entitled "ELECTRICAL VAPORISATION OF LIQUIDS," offers same for licence or otherwise to ensure practical working in Great Britain. Inquiries to **SINGER, STERN & CARLBERG, 14, EAST JACKSON BOULEVARD, CHICAGO, 4, ILLINOIS, U.S.A.**

THE Proprietors of **BRITISH PATENT No. 621,792,** relating to "PROCESS FOR MAKING DRY STARCH PREPARATIONS SOLUBLE IN COLD WATER," are desirous of entering into negotiations with firms in this country for the purpose of exploiting the above invention, either by sale of the patent rights or by granting of licences to manufacture on a royalty basis. Inquiries should be addressed to **ABEL & IMRAY, QUALITY HOUSE, QUALITY COURT, CHANCERY LANE, LONDON, W.C.2.**

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